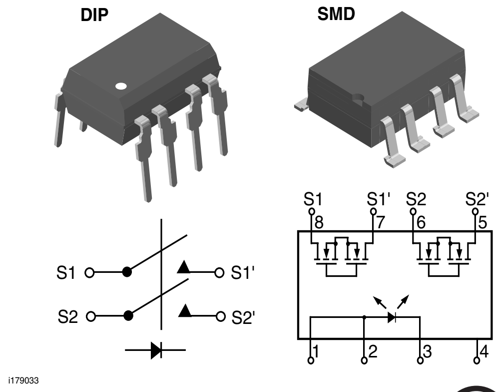
2 Form A Solid State Relay



Features

- Current Limit Protection
- Isolation Test Voltage 5300 V_{RMS}
- Typical R_{ON} 10 Ω
- Load Voltage 200 V
- Load Current 140 mA
- High Surge Capability
- Clean Bounce Free Switching
- Low Power Consumption
- High Reliability Monolithic output die
- SMD Lead Available on Tape and Reel

- Lead-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

Agency Approvals

- UL1577, File No. E52744 System Code H or J, Double Protection
- CSA - Certification 093751
- DIN EN 60747-5-2 (VDE0884)
  DIN EN 60747-5-5 pending

Applications

General Telecom Switching
- On/off Hook Control
- Ring Delay
- Dial Pulse
- Ground Start
- Ground Fault Protection
Instrumentation
Industrial Controls

Description

The LH1513 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 circuity, and DMOS switches. In addition, these relays employ current-limiting circuity, enabling them to pass FCC 68.302 and other regulatory voltage surge requirements when overvoltage protection is provided.

Order Information

Part	Remarks
LH1513AAC	Tubes, SMD-8
LH1513AACTR	Tape and Reel, SMD-8
LH1513AB	Tubes, DIP-8

Absolute Maximum Ratings, T_{amb} = 25 °C

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 time can adversely affect reliability.

SSR

Parameter	Test condition	Symbol	Value	Unit
LED continuous forward current		I_F	50	mA
LED reverse voltage	$I_R \le 10\ \mu A$	V_R	8.0	V
DC or peak AC load voltage	$I_L \le 50\ \mu A$	V_L	200	V
Continuous DC load current, one pole operating		I_L	200	mA
Continuous DC load current, two poles operating		I_L	140	mA
Peak load current (single shot)	t = 100 ms	I_P	1)	
Ambient temperature range		T_{amb}	- 40 to + 85	°C
Storage temperature range		T_{stg}	- 40 to + 150	°C
Pin soldering temperature	t = 10 s max	T_{sld}	260	°C
Input/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

1) Refer to Current Limit Performance Application Note for a discussion on relay operation during transient currents.

Electrical Characteristics, T_{amb} = 25 °C

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.

Input

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
LED forward current, switch turn-on	I_L = 100 mA, t = 10 ms	I_{Fon}		2.0	3.0	mA
LED forward current, switch turn-off	V_L = ± 150 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

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
ON-resistance	I_F = 5.0 mA, I_L = 50 mA	R_{ON}	6.0	10	15	Ω
Pole-to-pole ON-resistance matching (S1 to S2)	I_F = 5.0 mA, I_L = 50 mA			0.1	1.0	ΔΩ
Off-resistance	I_F = 0 mA, V_L = ± 100 V	R_{OFF}	0.5	5000		GΩ
Current limit	I_F = 5.0 mA, t = 5.0 ms, V_L = ± 5.0 V	I_{LMT}	300	360	460	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 = ± 200 V	I_O			1.0	µA
Output capacitance	I_F = 0 mA, V_L = 1.0 V	C_O		60		pF
	I_F = 0 mA, V_L = 50 V	C_O		15		pF

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Pole-to-pole capacitance (S1 to S2)	I_F = 0 mA			3.0		pF
	I_F = 5.0 mA			4.0		pF
Switch offset	I_F = 5.0 mA	V_{OS}		0.15		V

Transfer

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Capacitance (input-output)	V_{ISO} = 1.0 V	C_{IO}		1.1		pF
Turn-on time	I_F = 10.0 mA, I_L = 50 mA	t_{on}		1.6	2.5	ms
Turn-off time	I_F = 10.0 mA, I_L = 50 mA	t_{off}		0.65	2.5	ms

Typical Characteristics (Tamb = 25 °C unless otherwise specified)

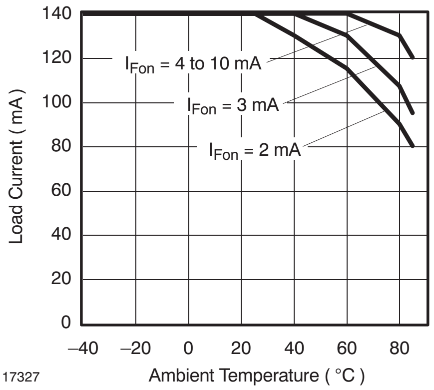


Figure 1. Recommended Operating Conditions

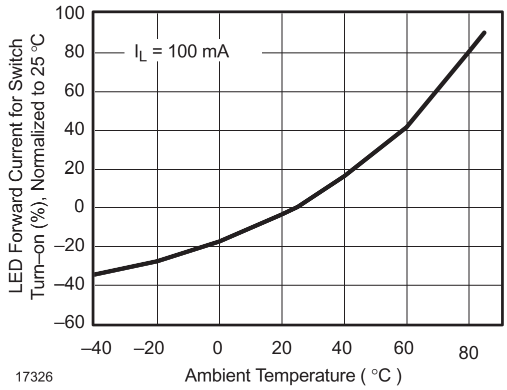


Figure 3. LED Current for Switch Turn-on vs. Temperature

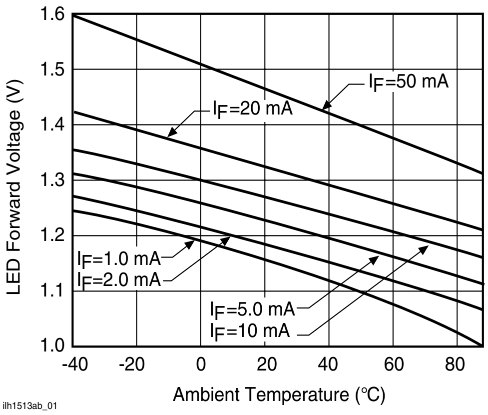


Figure 2. LED Voltage vs. Temperature

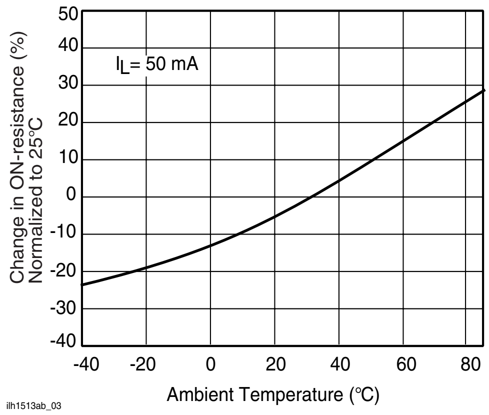


Figure 4. ON-Resistance vs. Temperature

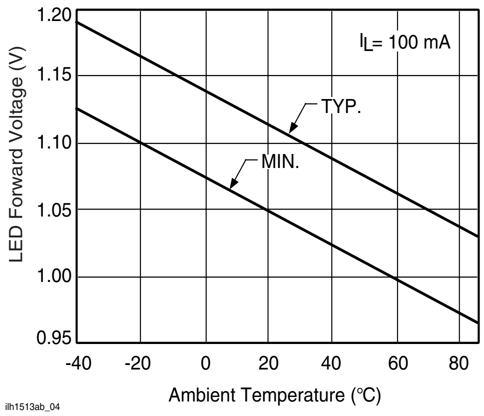


Figure 5. LED Dropout Voltage vs. Temperature

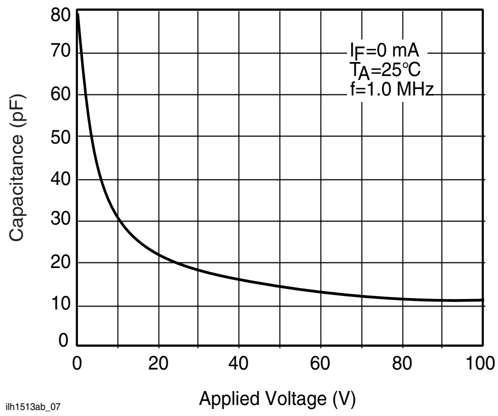


Figure 8. Switch Capacitance vs. Applied Voltage

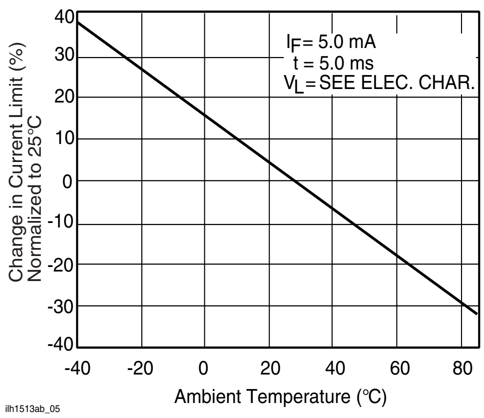


Figure 6. Current Limit vs. Temperature

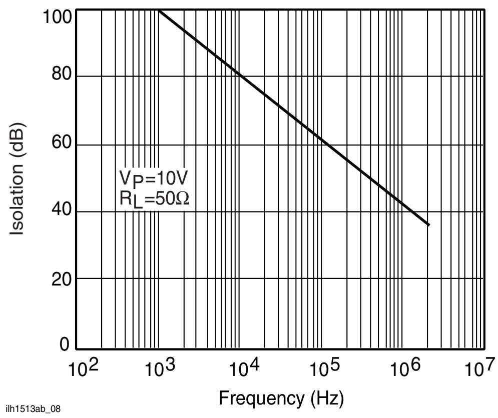


Figure 9. Output Isolation

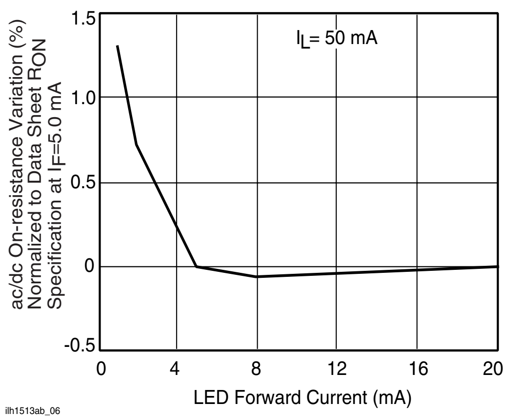


Figure 7. Variation in ON-Resistance vs. LED Current

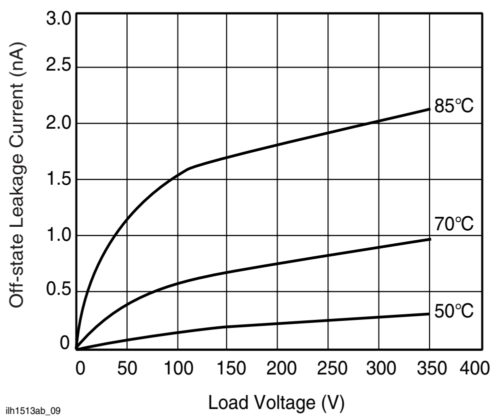


Figure 10. Leakage Current vs. Applied Voltage at Elevated Temperatures

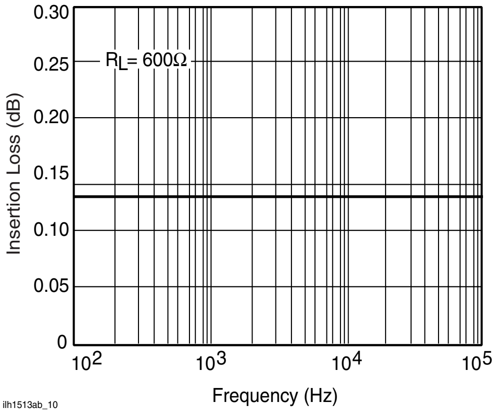


Figure 11. Insertion Loss vs. Frequency

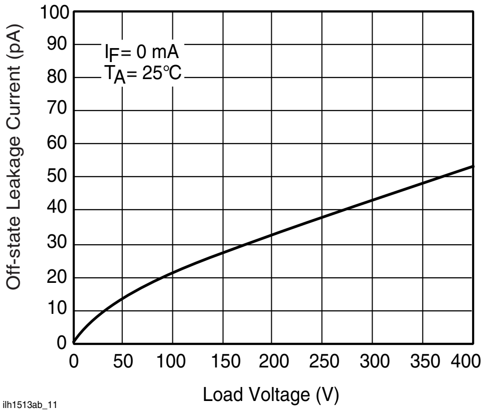


Figure 12. Leakage Current vs. Applied Voltage

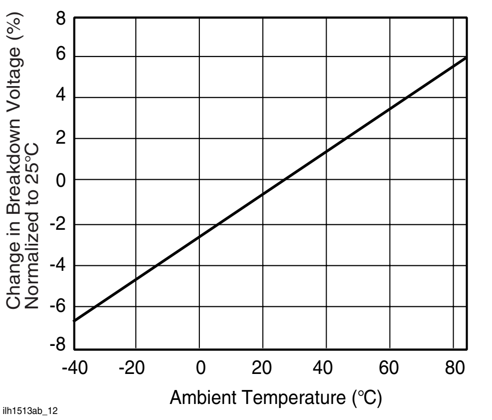


Figure 13. Switch Breakdown Voltage vs. Temperature

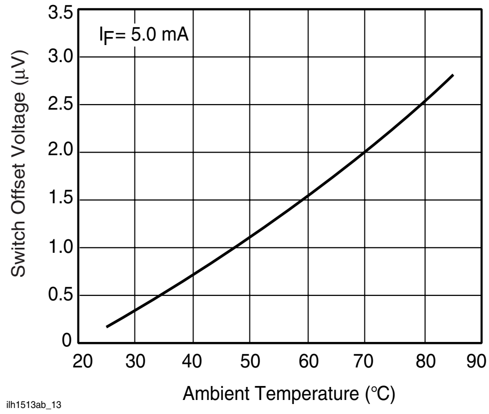


Figure 14. Switch Offset Voltage vs. Temperature

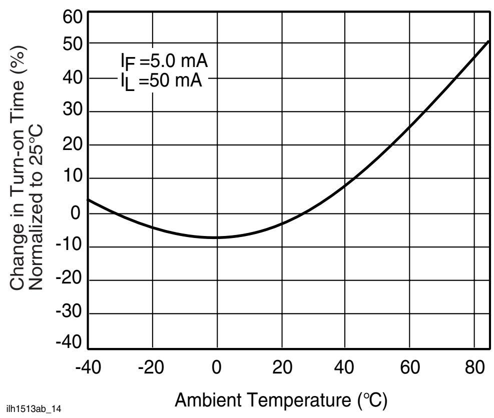


Figure 15. Turn-on Time vs. Temperature

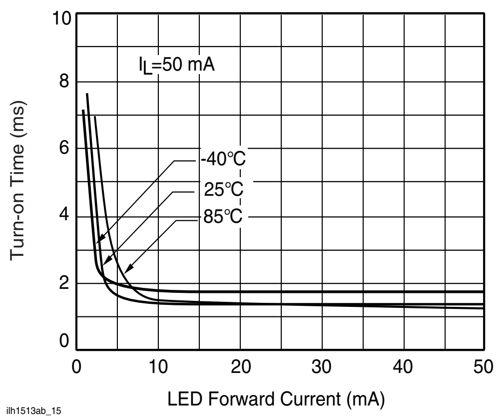


Figure 16. Turn-on Time vs. LED Current

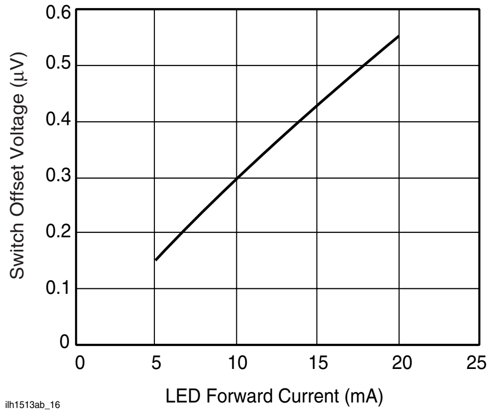


Figure 17. Switch Offset Voltage vs. LED Current

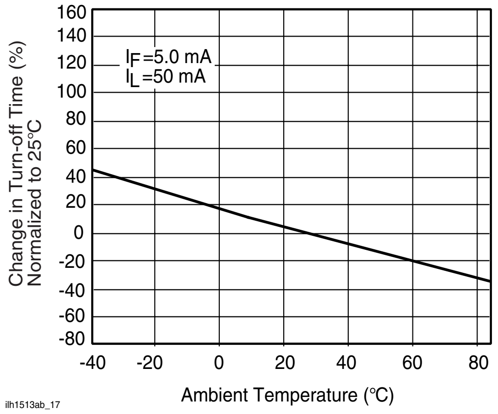


Figure 18. Turn-off Time vs. Temperature

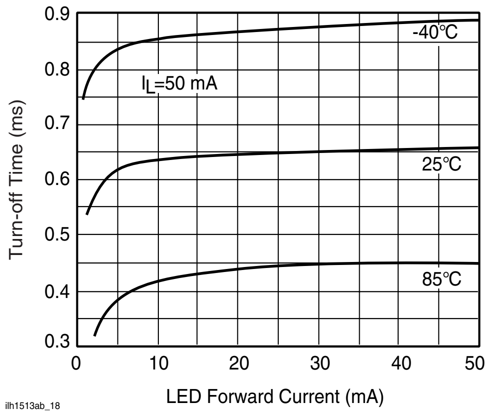
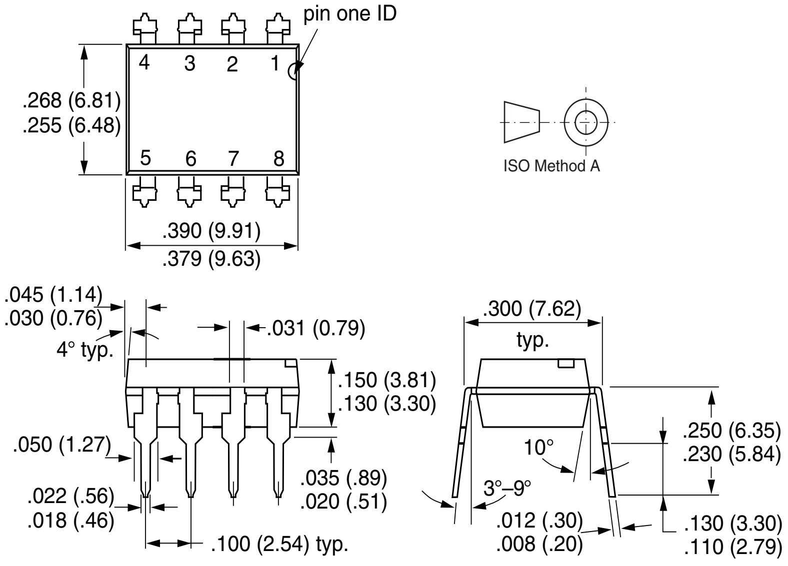


Figure 19. Turn-off Time vs. LED Current

Package Dimensions in Inches (mm)

DIP



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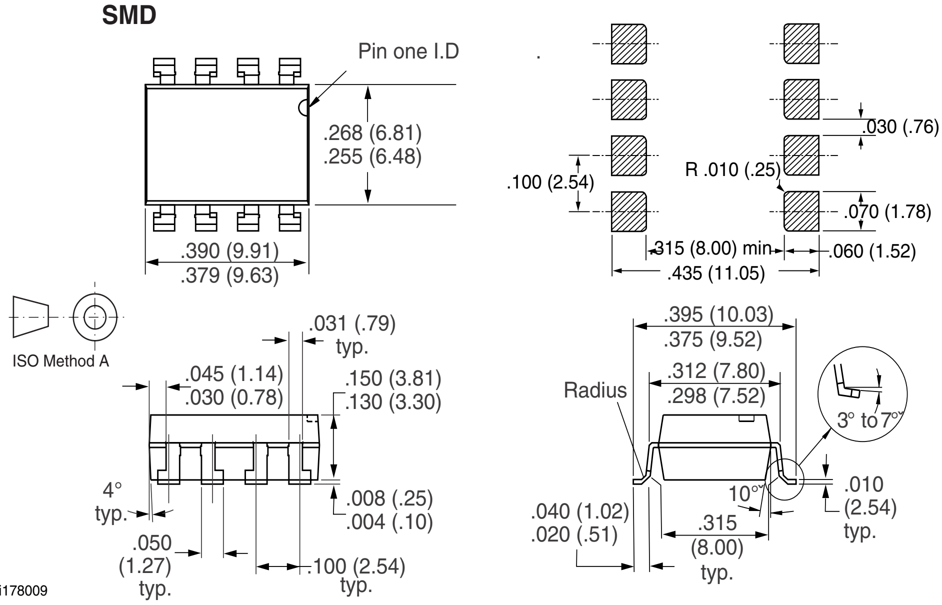
Package Dimensions in Inches (mm)

SMD



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Ozone Depleting Substances Policy Statement

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operatingsystems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

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