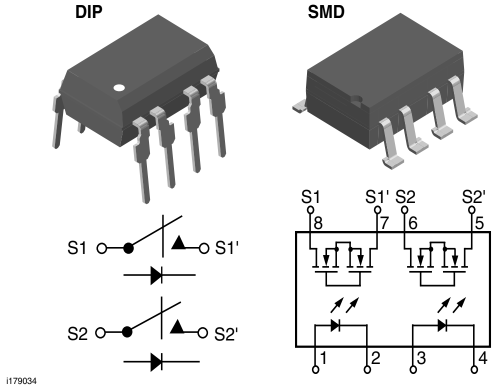
Dual 1 Form A Solid State Relay (Low Capacitance)



Features

- Dual Channel, LH1541 Type
- Low Capacitance Switch (5.0 pF)
- Isolation Test Voltage 5300 V_{RMS}
- Extremely High OFF-resistance
- Load Voltage 200 V
- Clean Bounce Free Switching
- Low Power Consumption
- High Reliability Monolithic detector
- 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
- BSI/BABT Cert. No. 7980
- DIN EN 60747-5-2 (VDE0884)
  DIN EN 60747-5-5 pending
- FIMKO Approval

Applications

Instrumentation
- Thermocouple Switching
- Analog Multiplexing

Reed Relay Replacement

Programmable Logic Controllers

Data Acquisition

Test Equipment

Description

These dual SSRs (LH1544, Dual 1 Form A) are SPST normally open switches which can replace electromechanical relays in many applications. The relays provide a low-capacitance, high-voltage switch contact with high off-resistance and low switch-offset voltage. These characteristics, combined with high-speed actuation, result in an SSR which is ideal for small signal and dc instrumentation applications.

The relays are constructed by using a GaAIAs LED for actuation control and an integrated monolithic die for the switch output. The die is comprised of a photodiode array, switch-control circuity, and low-capacitance MOSFET switches.

Order Information

Part	Remarks
LH1544AAC	Tubes, SMD-8
LH1544AACTR	Tape and Reel, SMD-8
LH1544AB	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	$I_R \leq 10$ µA	V_R	8.0	V
DC or peak AC load voltage	$I_L \leq 50$ µA	V_L	200	V
Continuous DC load current - one pole operating		I_L	55	mA
Continuous DC load current - two pole operating		I_L	40	mA
Peak load current (single shot)	t = 100 ms	I_P	100	mA
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)[1)]	dry air, dust free, at sea level		1600	V
Output power dissipation (continuous)		P_{diss}	600	mW

[1)] Breakdown occurs between the output pins external to the package

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}		0.9	2.0	mA
LED forward current, switch turn-off	$V_L = \pm 300$ V	I_{Foff}	0.2	0.8		mA
LED forward voltage	I_F = 5.0 mA	V_F	1.10	1.19	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}	70	110	160	Ω
Off-resistance	I_F = 0 mA, $V_L = \pm 100$ V	R_{OFF}	0.5	10000		GΩ
Off-state leakage current	I_F = 0 mA, $V_L = \pm 100$ V	I_O		0.01	200	nA
	I_F = 0 mA, $V_L = \pm 350$ V	I_O			1.0	µA
Output capacitance	I_F = 0 mA, V_L = 1.0 V	C_O		0		pF
Output capacitance Pin 4 to 6	I_F = 0 mA, V_L = 50 V	C_O		0.5		pF
Pole-to-pole Capacitance (S1 to S2)	I_F = 5.0 mA			0.5		pF
Switch offset	I_F = 5.0 mA	V_{OS}		0.1		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 = 5.0 mA, I_L = 50 mA	t_{on}		0.13	0.25	ms
Turn-off time	I_F = 5.0 mA, I_L = 50 mA	t_{off}		0.6	0.25	ms

Footnotes

The following information refers to the SSR Recommended Operation Conditions:

- Both relays on with equal load currents. For single relay operation, refer to the LH1541 Recommended Operating Conditions graph.

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

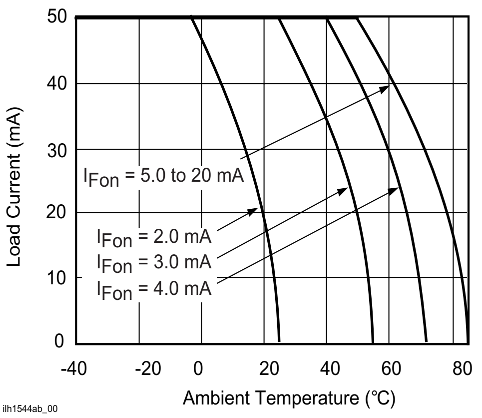


Figure 1. Recommended Operating Conditions

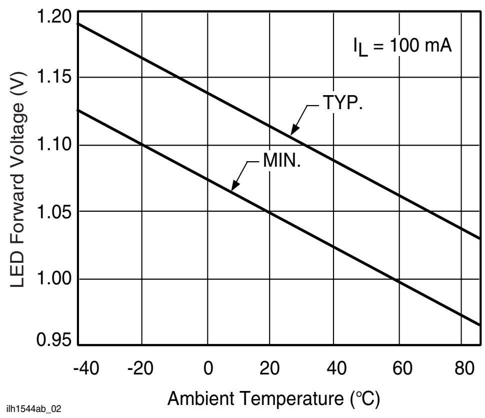


Figure 3. LED Dropout Voltage vs. Temperature

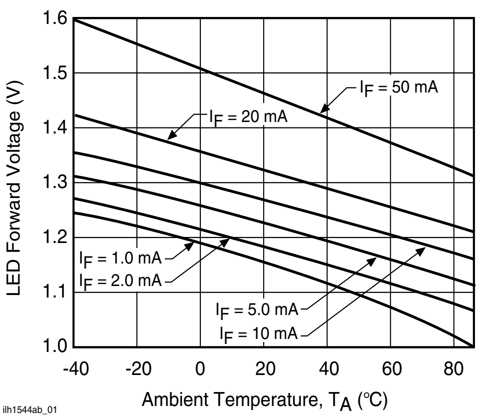


Figure 2. LED Voltage vs. Temperature

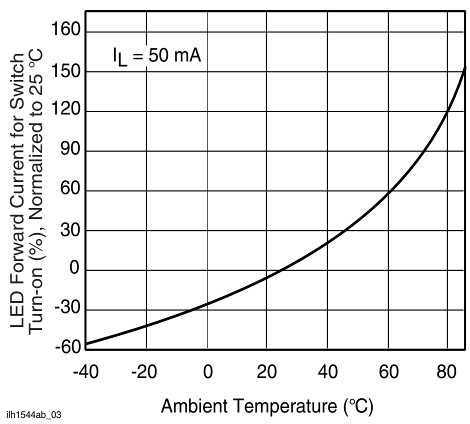


Figure 4. LED Current for Switch Turn-on vs. Temperature

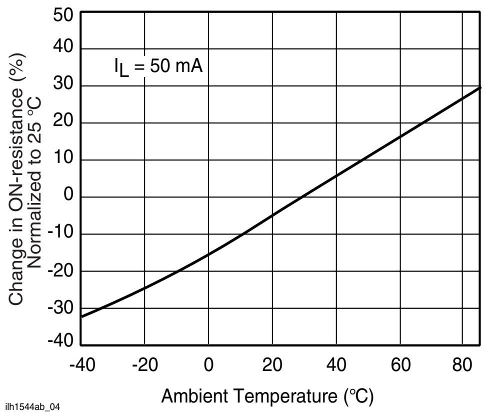


Figure 5. ON-Resistance vs. Temperature

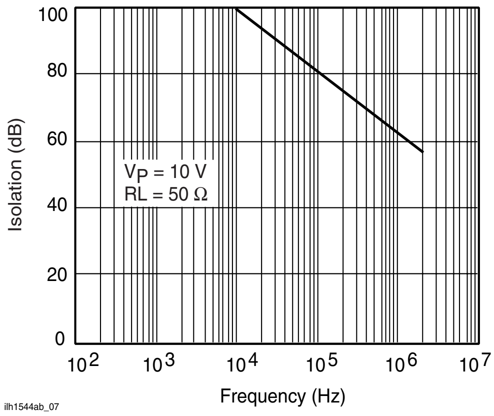


Figure 8. Output Isolation

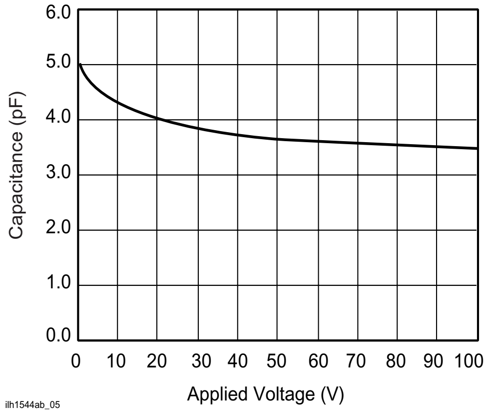


Figure 6. Switch Capacitance vs. Applied Voltage

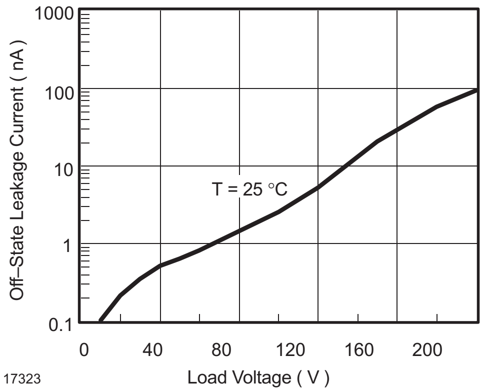


Figure 9. Leakage Current vs. Applied Voltage

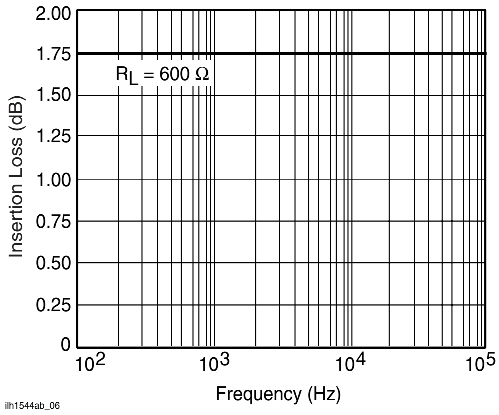


Figure 7. Insertion Loss vs. Frequency

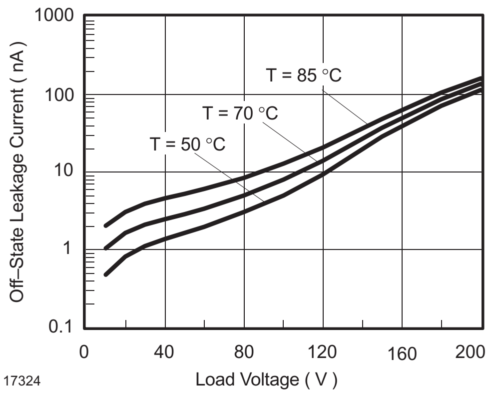


Figure 10. Leakage Current vs. Applied Voltage at Elevated Temperatures

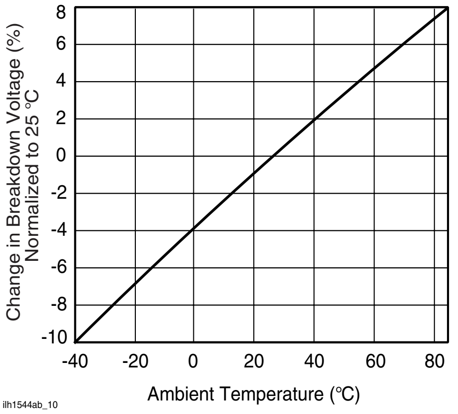


Figure 11. Switch Breakdown Voltage vs. Temperature

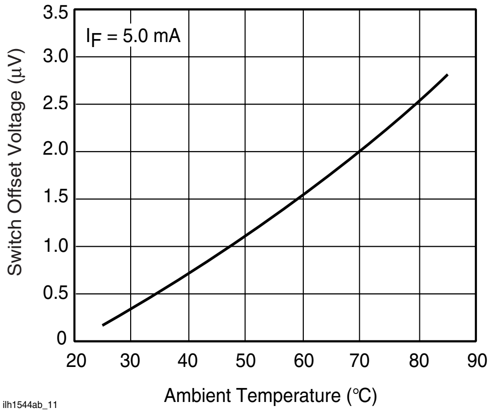


Figure 12. Switch Offset Voltage vs. Temperature

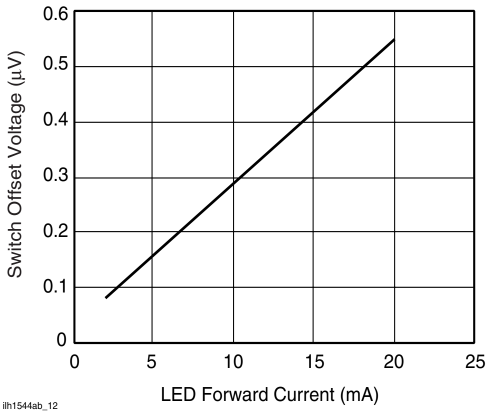


Figure 13. Switch Offset Voltage vs. LED Current

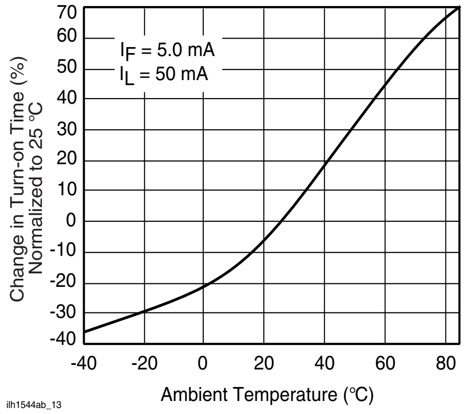


Figure 14. Turn-on Time vs. Temperature

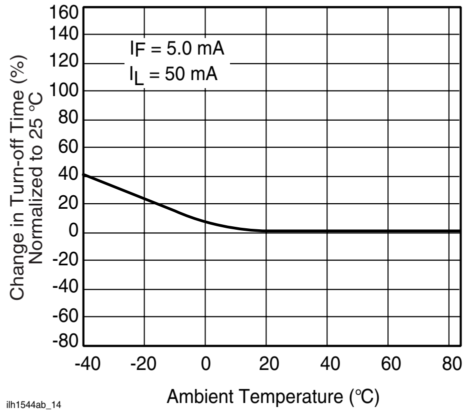


Figure 15. Turn-off Time vs. Temperature

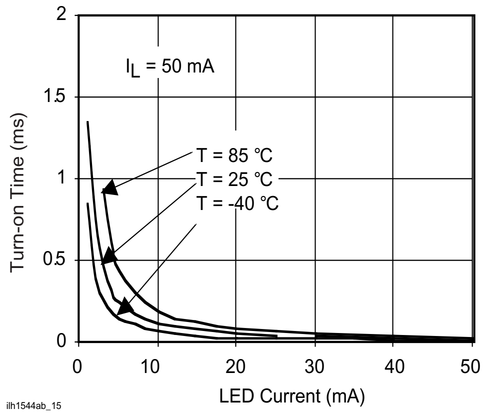


Figure 16. Turn-on Time vs. LED Current

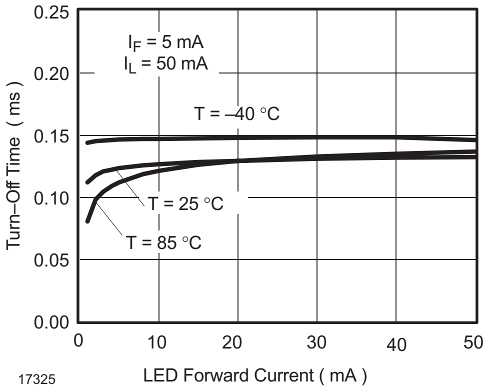
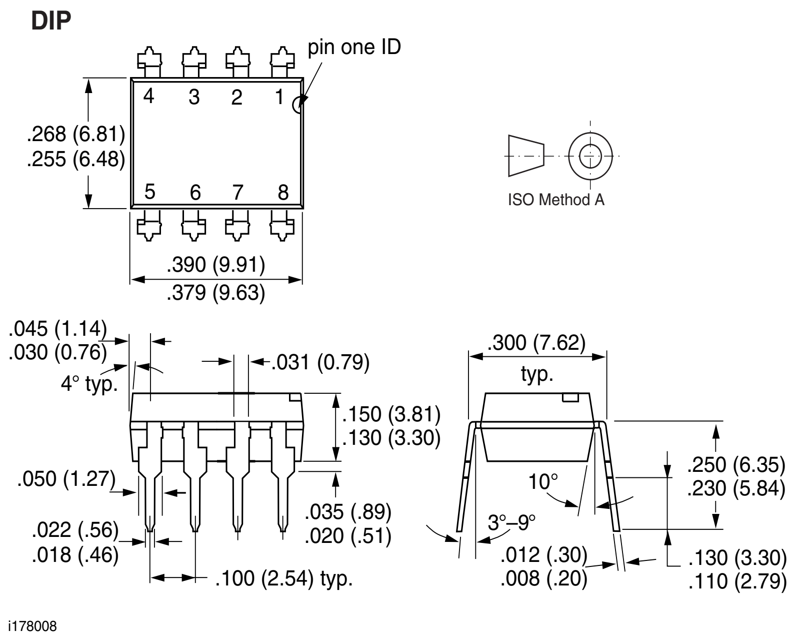


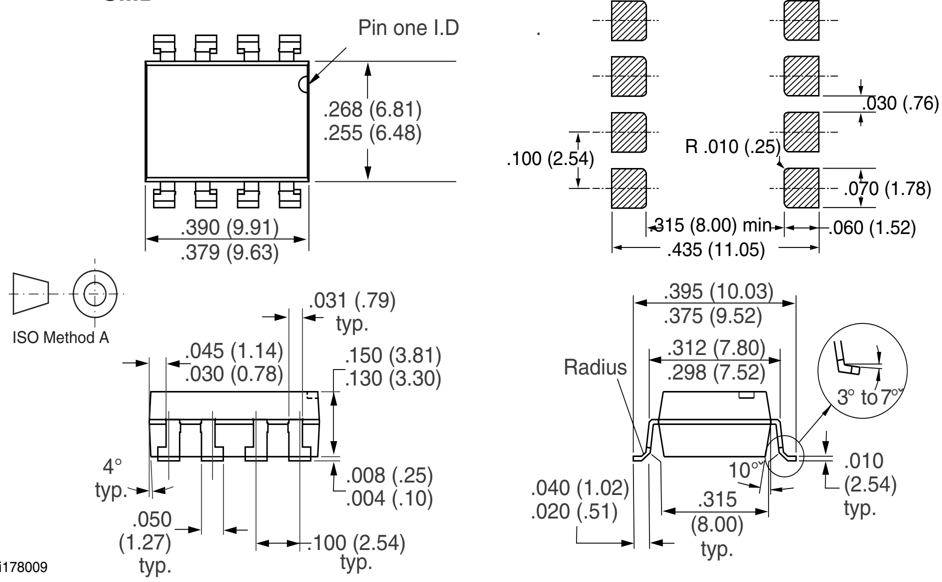
Figure 17. Turn-off Time vs. LED Current

Package Dimensions in Inches (mm)



Package Dimensions in Inches (mm)

SMD



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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