

Dual 1 Form A Solid State Relay

Features

- Dual Channel (LH1510)
- Current Limit Protection
- Isolation Test Voltage 5300 V_{RMS}
- Typical R_{ON} 10 Ω
- Load Voltage 200 V
- Load Current 120 mA
- High Surge Capability
- Clean Bounce Free Switching
- Low Power Consumption
- 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

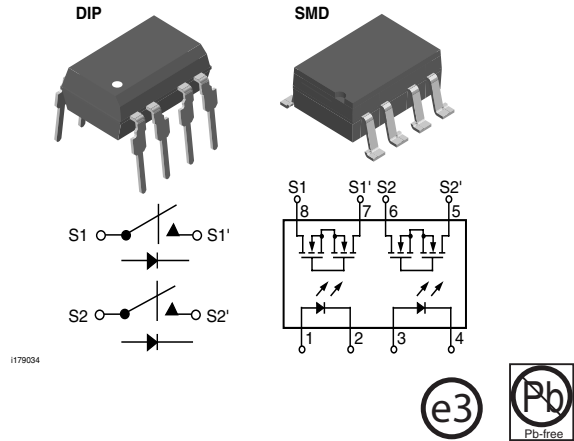
- UL1577, File No. E52744 System Code H or J, Double Protection
- CSA - Certification 093751
- BSI/BABT Cert. No. 7980
- DIN EN 60747-5-2 (VDE0884)
DIN EN 60747-5-5 pending
- FIMKO Approval

Applications

General Telecom Switching

- On/off Hook Control
- Ring Delay
- Dial Pulse
- Ground Start
- Ground Fault Protection

Instrumentation



Industrial Controls

Description

The LH1522 dual 1 Form A relays are SPST normally open switches that can replace electromechanical relays in many applications. They 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 MOSFET switches. In addition, the LH1522 SSRs employ current-limiting circuitry, enabling them to pass FCC 68.302 and other regulatory surge requirements when overvoltage protection is provided.

Order Information

Part	Remarks
LH1522AAC	Tubes, SMD-8
LH1522AACTR	Tape and Reel, SMD-8
LH1522AB	Tubes, DIP-8

Absolute Maximum Ratings, $T_{amb} = 25\text{ }^{\circ}\text{C}$

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	$I_R \leq 10\text{ }\mu\text{A}$	V_R	8.0	V
DC or peak AC load voltage	$I_L \leq 50\text{ }\mu\text{A}$	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)	$t = 100\text{ ms}$	I_P	2)	
Ambient temperature range		T_{amb}	- 40 to + 85	$^{\circ}\text{C}$
Storage temperature range		T_{stg}	- 40 to + 150	$^{\circ}\text{C}$
Pin soldering temperature	$t = 10\text{ s max}$	T_{sld}	260	$^{\circ}\text{C}$
Input/output isolation test voltage	$t = 1.0\text{ s}, I_{ISO} = 10\text{ }\mu\text{A max}$	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.

²⁾ Refer to Current Limit Performance Application Note 58 for a discussion on relay operation during transient currents.

Electrical Characteristics, $T_{amb} = 25\text{ }^{\circ}\text{C}$

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	$I_L = 100\text{ mA}, t = 10\text{ ms}$	I_{Fon}		1.0	2.0	mA
LED forward current, switch turn-off	$V_L = \pm 150\text{ V}$	I_{Foff}	0.2	1.1		mA
LED forward voltage	$I_F = 10\text{ mA}$	V_F	1.15	1.26	1.45	V

Output

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
ON-resistance	$I_F = 5.0\text{ mA}, I_L = 50\text{ mA}$	R_{ON}	6.0	10	15	Ω
OFF-resistance	$I_F = 0\text{ mA}, V_L = \pm 100\text{ V}$	R_{OFF}	0.5	5000		$G\Omega$
Current limit	$I_F = 5.0\text{ mA}, t = 5.0\text{ ms},$ $V_L = \pm 5.0\text{ V}$	I_{LMT}	300	360	460	mA
Off-state leakage current	$I_F = 0\text{ mA}, V_L = \pm 100\text{ V}$	I_O		0.02	200	nA
	$I_F = 0\text{ mA}, V_L = \pm 200\text{ V}$	I_O			1.0	μA

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Output capacitance	$I_F = 0 \text{ mA}, V_L = 1.0 \text{ V}$	C_O		60		pF
	$I_F = 0 \text{ mA}, V_L = 50 \text{ V}$	C_O		15		pF
Pole-to-pole capacitance (S1 to S2)	$I_F = 5.0 \text{ mA}$			0.5		pF
Switch offset	$I_F = 5.0 \text{ mA}$	V_{OS}		0.15		V

Transfer

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Capacitance (input-output)	$V_{ISO} = 1.0 \text{ V}$	C_{IO}		1.1		pF
Turn-on time	$I_F = 10.0 \text{ mA}, I_L = 50 \text{ mA}$	t_{on}		1.0	2.0	ms
Turn-off time	$I_F = 10.0 \text{ mA}, I_L = 50 \text{ mA}$	t_{off}		0.7	2.0	ms

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

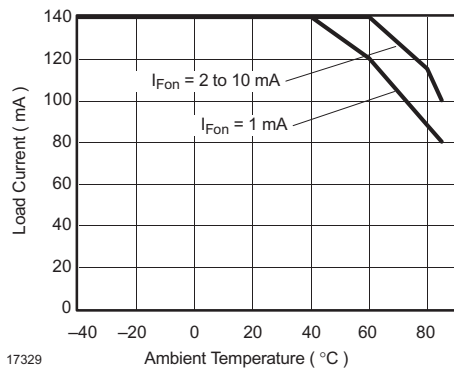


Figure 1. Recommended Operating Conditions

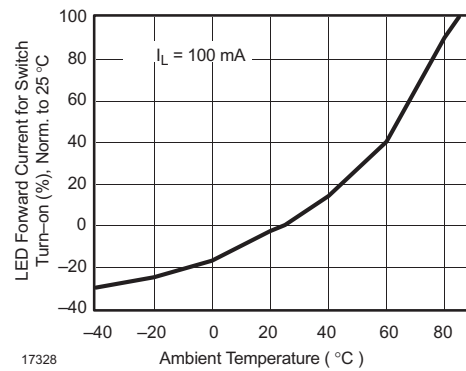


Figure 3. LED Current for Switch Turn-on vs. Temperature

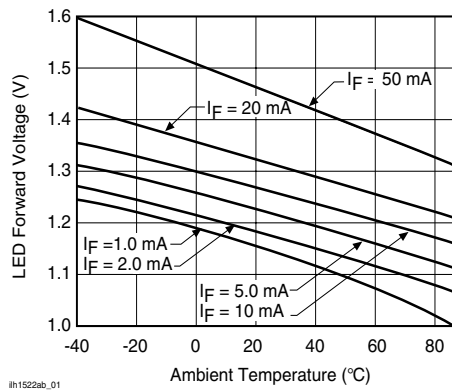


Figure 2. LED Voltage vs. Temperature

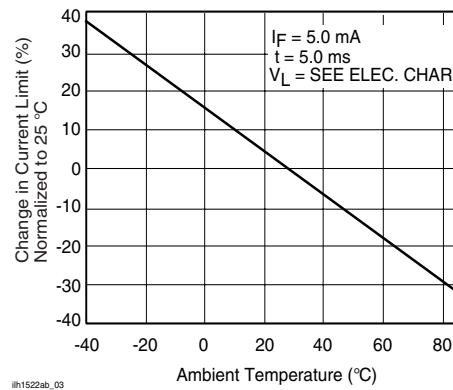
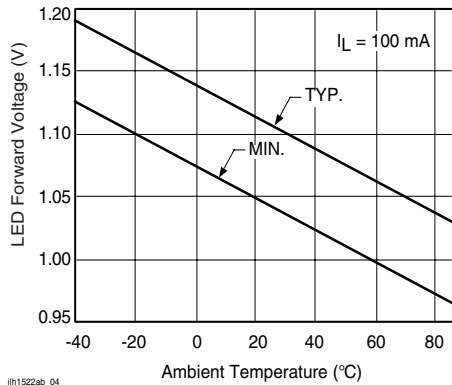
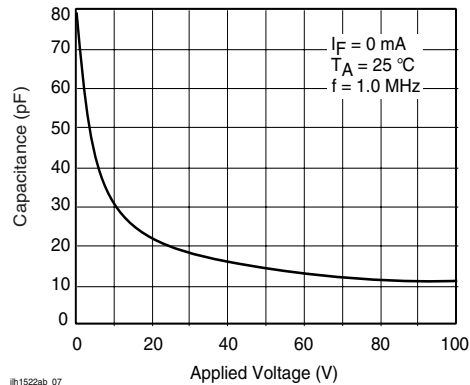


Figure 4. Current Limit vs. Temperature



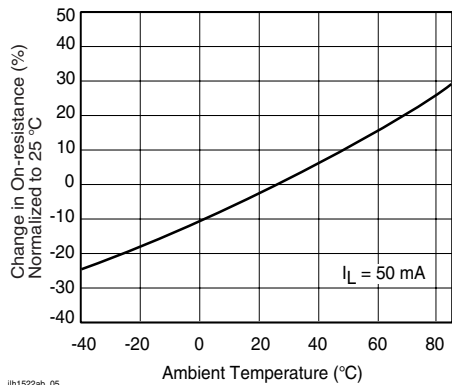
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Figure 5. LED Dropout Voltage vs. Temperature



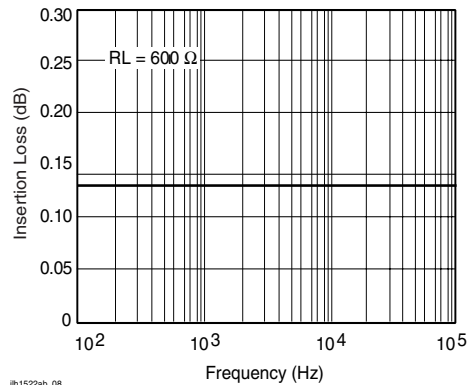
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Figure 8. Switch Capacitance vs. Applied Voltage



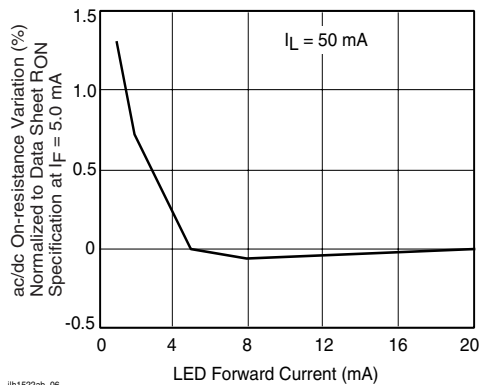
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Figure 6. ON-Resistance vs. Temperature



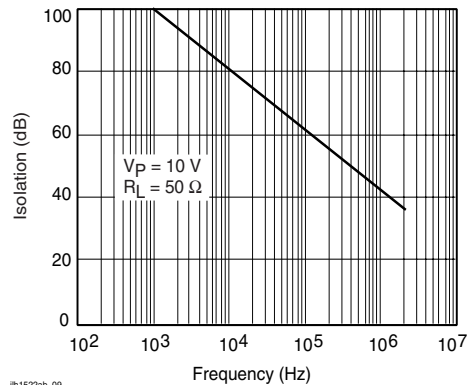
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Figure 9. Insertion Loss vs. Frequency



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



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Figure 10. Output Isolation

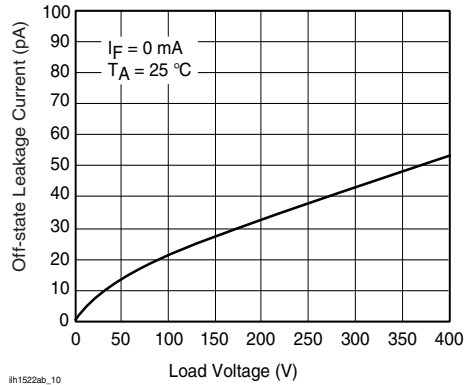


Figure 11. Leakage Current vs. Applied Voltage

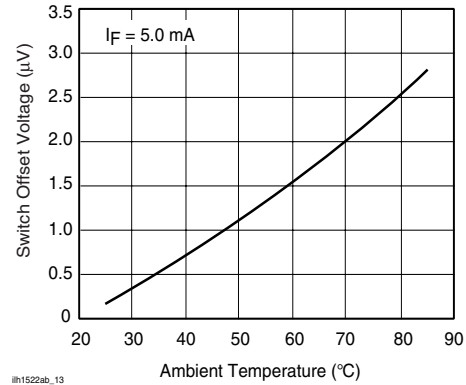


Figure 14. Switch Offset Voltage vs. Temperature

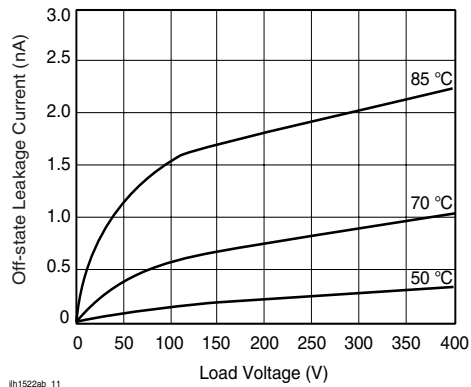


Figure 12. Leakage Current vs. Applied Voltage at Elevated Temperatures

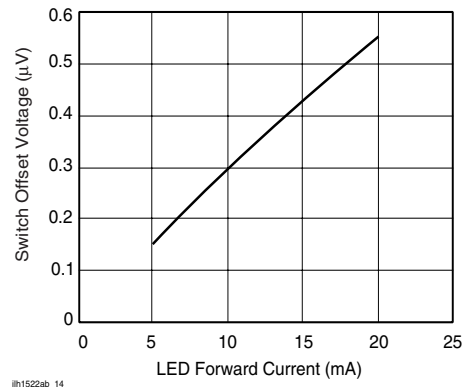


Figure 15. Switch Offset Voltage vs. LED Current

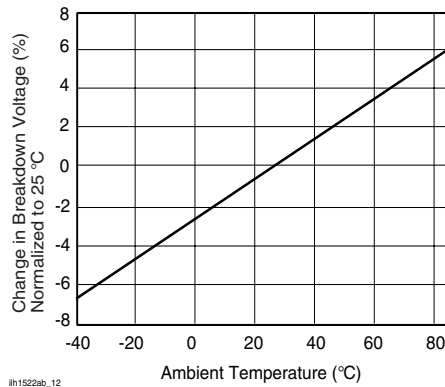


Figure 13. Switch Breakdown Voltage vs. Temperature

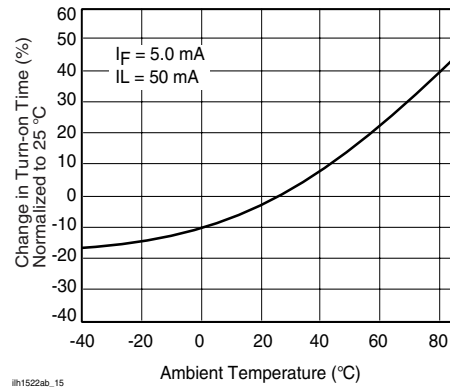
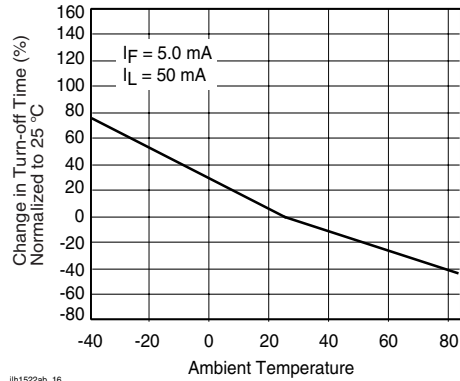
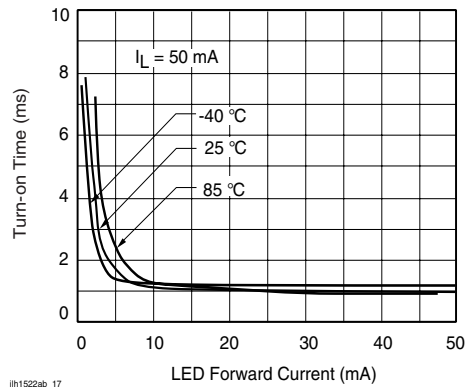


Figure 16. Turn-on Time vs. Temperature



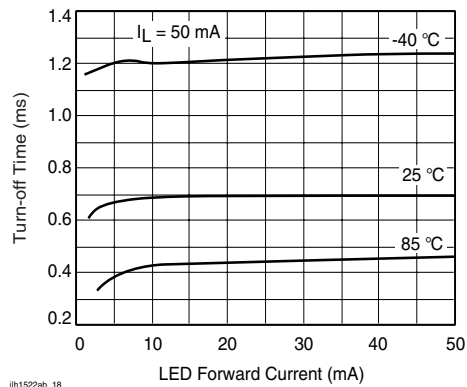
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Figure 17. Turn-off Time vs. Temperature



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Figure 18. Turn-on Time vs. LED Current

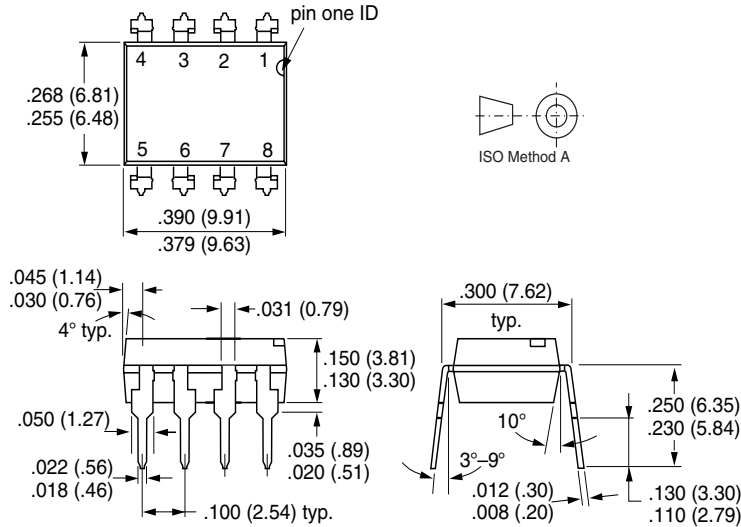


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Figure 19. Turn-off Time vs. LED Current

Package Dimensions in Inches (mm)

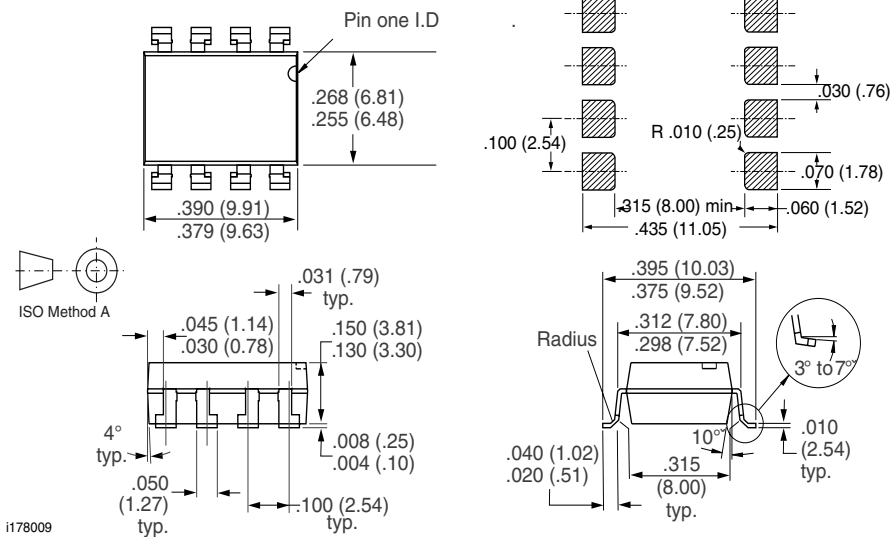
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i178008

Package Dimensions in Inches (mm)

SMD



i178009

Ozone Depleting Substances Policy Statement

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1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems 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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