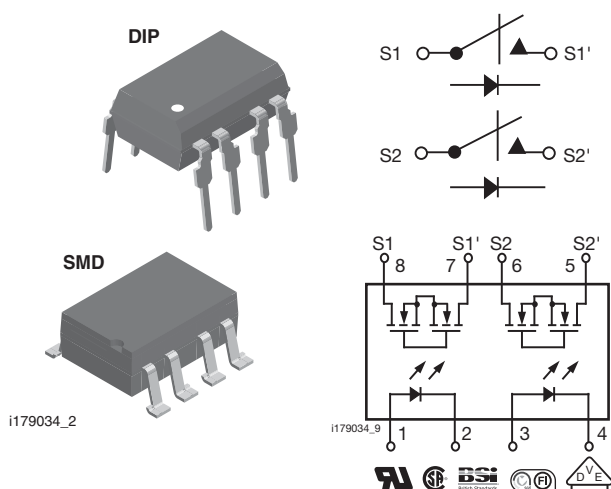


## Dual 1 Form A Solid State Relay (Low Capacitance)



### 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 GaAlAs LED for actuation control and an integrated monolithic die for the switch output. The die is comprised of a photodiode array, switch-control circuitry, and low-capacitance MOSFET switches.

### FEATURES

- Dual channel, LH1541 type
- Low capacitance switch (5 pF)
- Isolation test voltage 5300 V<sub>RMS</sub>
- Extremely high off-resistance
- Load voltage 200 V
- Clean bounce free switching
- Low power consumption
- High reliability monolithic detector
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

### APPLICATIONS

- Instrumentation
  - Thermocouple switching
  - Analog multiplexing
- Reed relay replacement
- Programmable logic controllers
- Data acquisition
- Test equipment

### AGENCY APPROVALS

UL1577: file no. E52744 system code H, double protection

CSA: certification no. 093751

BSI/BABT: certification no. 7980

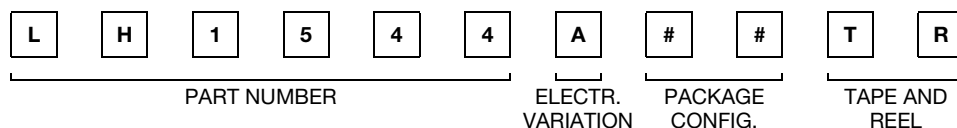
DIN EN: 60747-5-2 (VDE 0884)/60747-5-5 (pending), available with option 1

FIMKO: approval



**RoHS**  
COMPLIANT

### ORDERING INFORMATION



PACKAGE	UL, CSA, BSI, VDE, FIMKO
SMD-8, tubes	LH1544AAC
SMD-8, tape and reel	LH1544AACTR
DIP-8, tubes	LH1544AB

# LH1544AAC, LH1544AACTR, LH1544AB



Vishay Semiconductors Dual 1 Form A Solid State Relay  
(Low Capacitance)

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	$I_L \leq 50\text{ }\mu\text{A}$	$V_L$	200	V
Continuous DC load current, one pole operating		$I_L$	55	mA
Continuous DC load current, two poles operating		$I_L$	40	mA
SSR				
Peak load current (single shot)	$t = 100\text{ ms}$	$I_P$	100	mA
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 <sup>(1)</sup>	$t = 10\text{ s max.}$	$T_{sld}$	260	$^{\circ}\text{C}$
Input to output isolation voltage		$V_{ISO}$	5300	$V_{RMS}$
Pole-to-pole isolation voltage (S1 to S2) <sup>(2)</sup>	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.
- <sup>(1)</sup> Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).
- <sup>(2)</sup> Breakdown occurs between the output pins external to the package.

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	$I_L = 100\text{ mA}$ , $t = 10\text{ ms}$	$I_{Fon}$		0.9	2	mA
LED forward current, switch turn-off	$V_L = \pm 150\text{ V}$	$I_{Foff}$	0.2	0.8		mA
LED forward voltage	$I_F = 5\text{ mA}$	$V_F$	1.1	1.19	1.45	V
OUTPUT						
On-resistance	$I_F = 5\text{ mA}$ , $I_L = 50\text{ mA}$	$R_{ON}$	70	110	160	$\Omega$
Off-resistance	$I_F = 0\text{ mA}$ , $V_L = \pm 100\text{ V}$	$R_{OFF}$	0.5	10 000		$G\Omega$
Off-state leakage current	$I_F = 0\text{ mA}$ , $V_L = \pm 100\text{ V}$	$I_O$		0.01	200	nA
	$I_F = 0\text{ mA}$ , $V_L = \pm 200\text{ V}$	$I_O$			1	$\mu\text{A}$
Output capacitance	$I_F = 0\text{ mA}$ , $V_L = 1\text{ V}$	$C_O$		0		pF
Output capacitance pin 4 to 6	$I_F = 0\text{ mA}$ , $V_L = 50\text{ V}$	$C_O$		0.5		pF
Pole-to-pole Capacitance (S1 to S2)	$I_F = 5\text{ mA}$			0.5		pF
Switch offset	$I_F = 5\text{ mA}$	$V_{OS}$		0.1		$\mu\text{V}$
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	$I_F = 5\text{ mA}$ , $I_L = 50\text{ mA}$	$t_{on}$		0.24	0.5	ms
Turn-off time	$I_F = 5\text{ mA}$ , $I_L = 50\text{ mA}$	$t_{off}$		0.13	0.5	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.



# LH1544AAC, LH1544AACTR, LH1544AB

Dual 1 Form A Solid State Relay  
(Low Capacitance)

Vishay Semiconductors

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

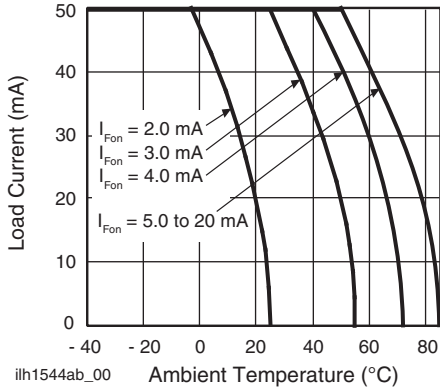


Fig. 1 - Recommended Operating Conditions

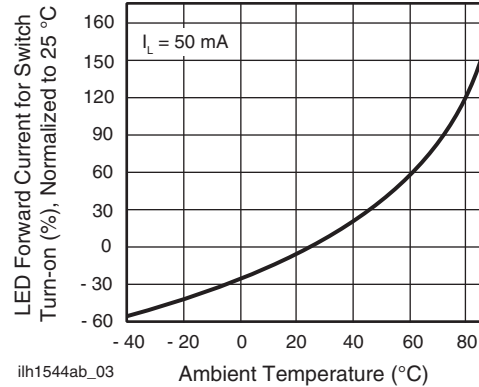


Fig. 4 - LED Current for Switch Turn-on vs. Temperature

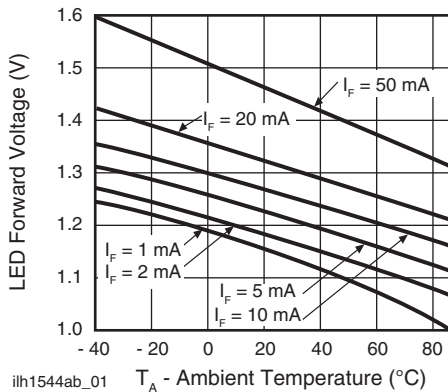


Fig. 2 - LED Voltage vs. Temperature

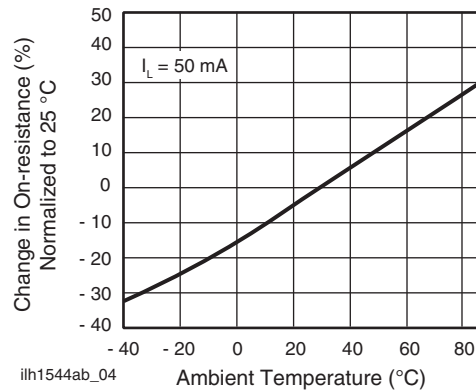


Fig. 5 - On-Resistance vs. Temperature

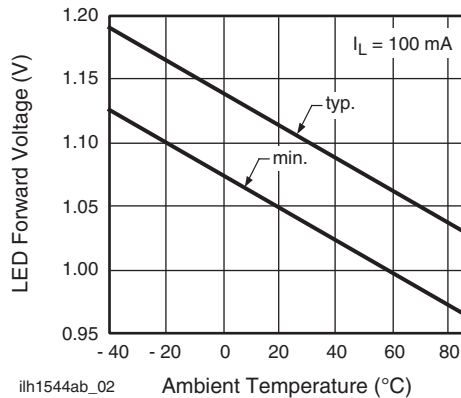


Fig. 3 - LED Dropout Voltage vs. Temperature

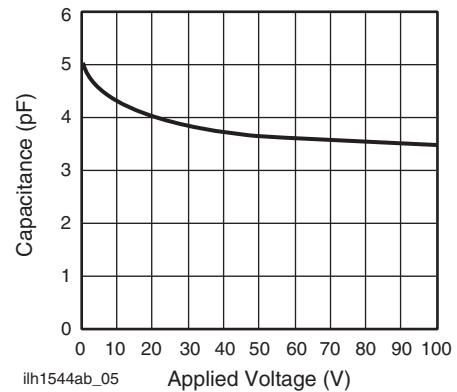


Fig. 6 - Switch Capacitance vs. Applied Voltage

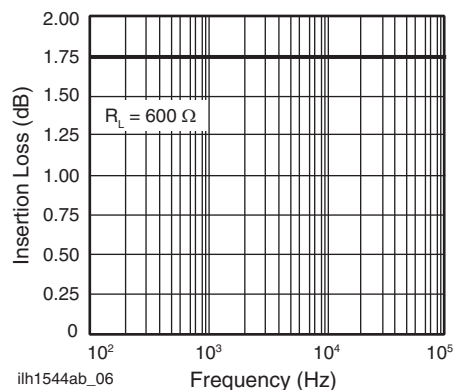


Fig. 7 - Insertion Loss vs. Frequency

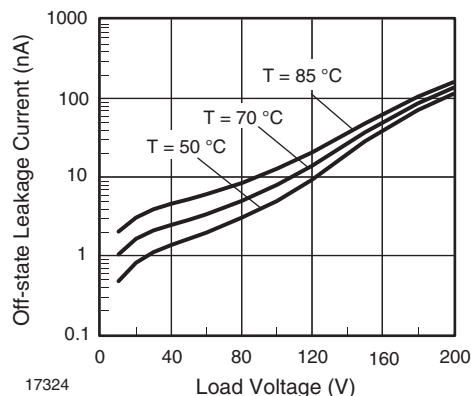


Fig. 10 - Leakage Current vs. Applied Voltage at Elevated Temperatures

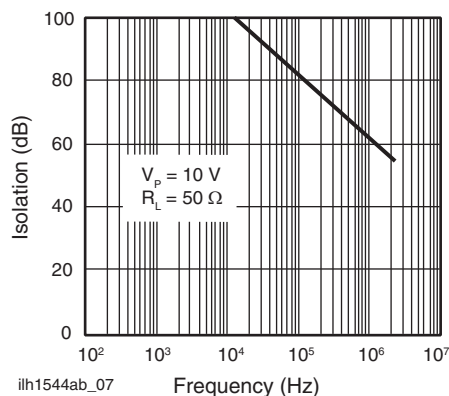


Fig. 8 - Output Isolation

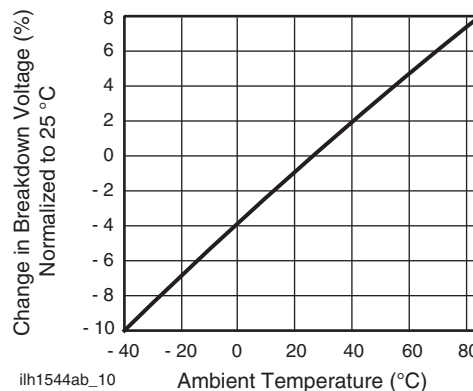


Fig. 11 - Switch Breakdown Voltage vs. Temperature

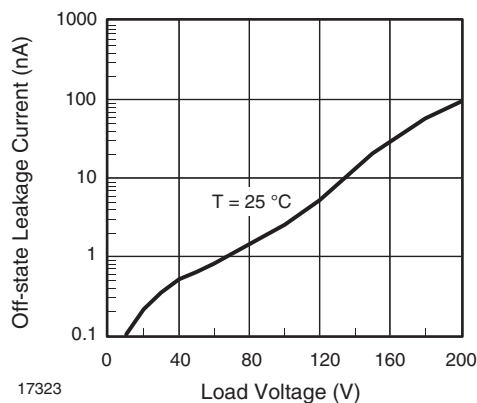


Fig. 9 - Leakage Current vs. Applied Voltage

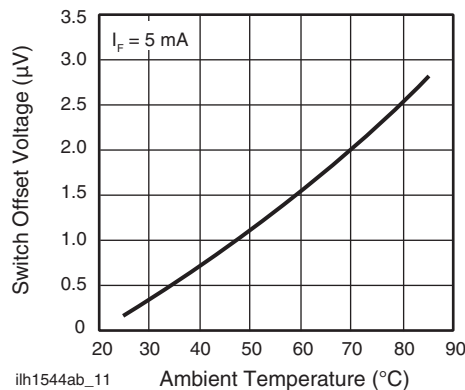


Fig. 12 - Switch Offset Voltage vs. Temperature



# LH1544AAC, LH1544AACTR, LH1544AB

Dual 1 Form A Solid State Relay    Vishay Semiconductors  
(Low Capacitance)

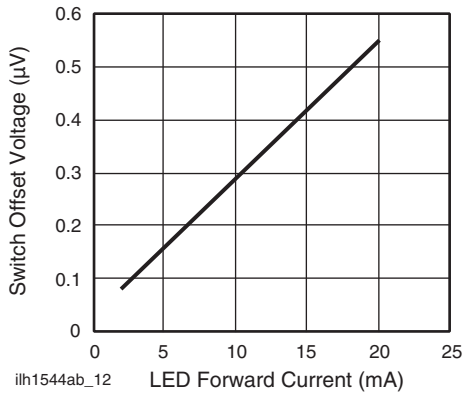


Fig. 13 - Switch Offset Voltage vs. LED Current

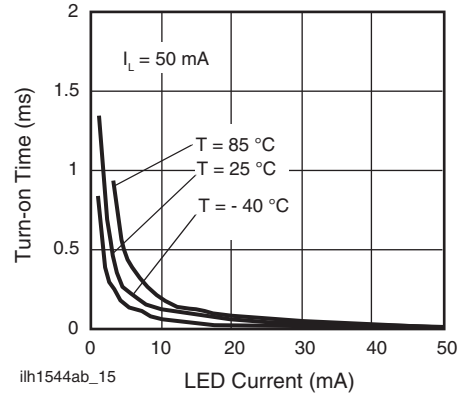


Fig. 16 - Turn-on Time vs. LED Current

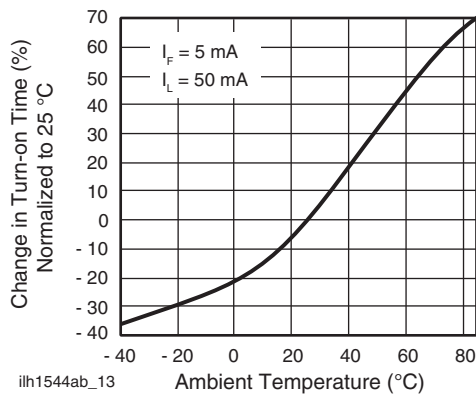


Fig. 14 - Turn-on Time vs. Temperature

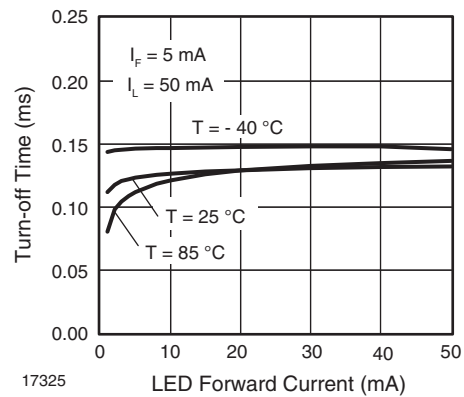


Fig. 17 - Turn-off Time vs. LED Current

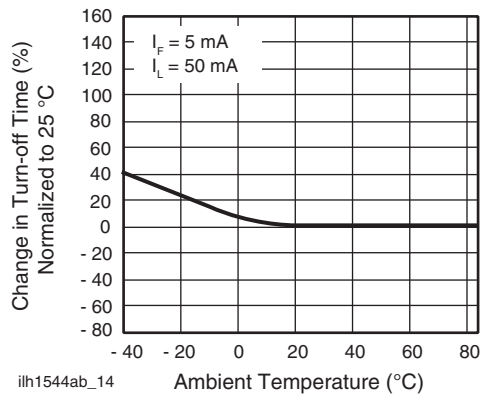


Fig. 15 - Turn-off Time vs. Temperature

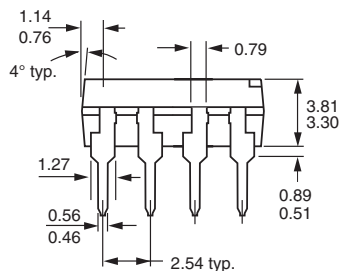
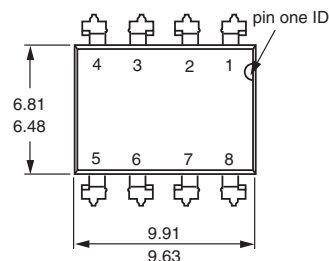
# LH1544AAC, LH1544AACTR, LH1544AB

Vishay Semiconductors Dual 1 Form A Solid State Relay  
(Low Capacitance)

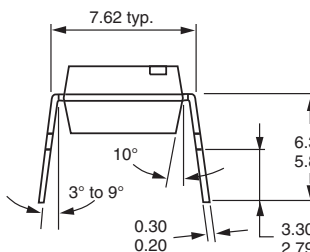


## PACKAGE DIMENSIONS in millimeters

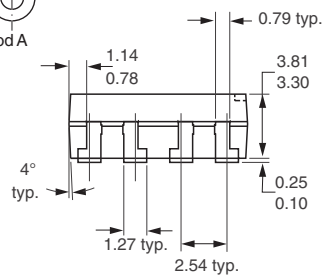
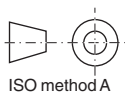
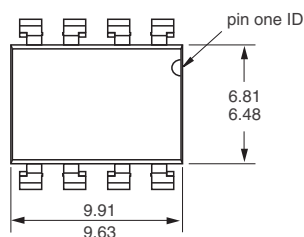
DIP



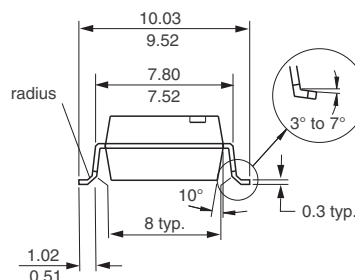
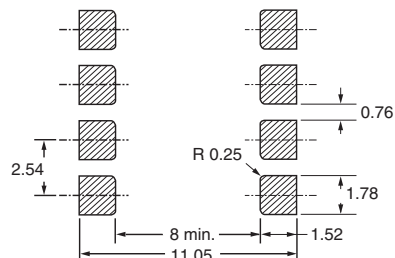
i178008



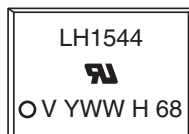
SMD



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## PACKAGE MARKING (example)



### Note

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



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