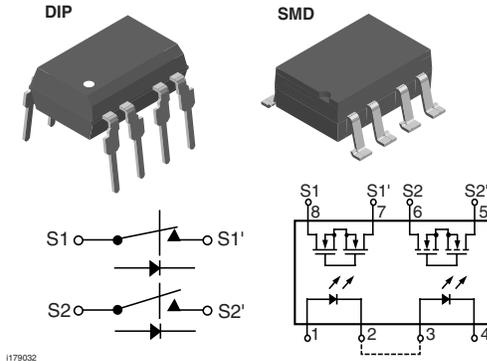


## Dual 1 Form A/B, C Solid State Relay



1179032

### DESCRIPTION

The LH1502 relays contain normally open and normally closed switches that can be used independently as a 1 form A and 1 form B relay, or when used together, as a 1 form C relay. The relays are constructed as a multi-chip hybrid device. Actuation control is via an infrared LED. The output switch is a combination of a photodiode array with MOSFET switches and control circuitry.

### FEATURES

- Current limit protection
- Isolation test voltage 3750 V<sub>RMS</sub>
- Typical R<sub>ON</sub> 20 Ω
- Load voltage 350 V
- Load current 150 mA
- High surge capability
- Clean bounce free switching
- Low power consumption
- SMD lead available on tape and reel
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC



**RoHS**  
COMPLIANT

### 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 or J, double protection

CSA: certification 093751

### ORDER INFORMATION

PART	REMARKS	PACKAGE
LH1502BAC	Tubes	SMD-8
LH1502BACTR	Tape and reel	SMD-8
LH1502BB	Tubes	DIP-8

### ABSOLUTE MAXIMUM RATINGS (1)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>SSR</b>				
LED continuous forward current		I <sub>F</sub>	50	mA
LED reverse voltage	I <sub>R</sub> ≤ 10 μA	V <sub>R</sub>	8.0	V
DC or peak AC load voltage	I <sub>L</sub> ≤ 50 μA	V <sub>L</sub>	350	V
Continuous DC load current (form C operation)		I <sub>L</sub>	150	mA
Peak load current, form A	t = 100 ms	I <sub>P</sub>	(4)	
Peak load current (single shot), form B		I <sub>P</sub>	350	mA

# LH1502BAC, LH1502BACTR, LH1502BB



Vishay Semiconductors Dual 1 Form A/B, C Solid State Relay

ABSOLUTE MAXIMUM RATINGS <sup>(1)</sup>				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>SSR</b>				
Ambient operating temperature range		$T_{amb}$	- 40 to + 85	°C
Storage temperature range		$T_{stg}$	- 40 to + 125	°C
Pin soldering temperature <sup>(2)</sup>	$t = 10$ s max.	$T_{sld}$	260	°C
Input to output isolation test voltage	$t = 1.0$ s, $I_{ISO} = 10$ $\mu$ A max.	$V_{ISO}$	3750	$V_{RMS}$
Pole-to-pole isolation voltage (S1 to S2) <sup>(3)</sup> , (dry air, dust free, at sea level)			1600	V
Output power dissipation (continuous)		$P_{diss}$	600	mW

## Notes

(1)  $T_{amb} = 25$  °C, unless otherwise specified.

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.

(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).

(3) Breakdown occurs between the output pins external to the package.

(4) Refer to current limit performance application note for a discussion on relay operation during transient currents.

ELECTRICAL CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
LED forward current, switch turn-on (NO)	$I_L = 100$ mA, $t = 10$ ms	$I_{Fon}$		0.6	2.0	mA
LED forward current, switch turn-off (NO)	$V_L = \pm 300$ V	$I_{Foff}$	0.4	0.5		mA
LED forward current, switch turn-on (NC)	$I_L = 300$ mA, $t = 10$ ms	$I_{Fon}$	0.2	0.9		mA
LED forward current, switch turn-off (NC)	$V_L = \pm 300$ V	$I_{Foff}$		1.0	2.0	mA
LED forward voltage	$I_F = 10$ mA	$V_F$	1.15	1.26	1.45	V
<b>OUTPUT</b>						
On-resistance (NO, NC)	$I_F = 5.0$ mA (NO), $I_F = 0$ mA (NC), $I_L = 50$ mA (NC)	$R_{ON}$	12	20	25	$\Omega$
Off-resistance (NO)	$I_F = 0$ mA, $V_L = \pm 100$ V	$R_{OFF}$	0.35	5000		G $\Omega$
Off-resistance (NC)	$I_F = 5.0$ mA, $V_L = \pm 100$ V	$R_{OFF}$	0.1	1.4		G $\Omega$
Current limit (NO)	$I_F = 5.0$ mA, $t = 5.0$ ms, $V_L = \pm 5.0$ V	$I_{LMT}$	270	290	380	mA
Off-state leakage current (NO)	$I_F = 0$ mA, $V_L = \pm 100$ V	$I_O$		0.02	1000	nA
Off-state leakage current (NC)	$I_F = 5.0$ mA, $V_L = \pm 100$ V	$I_O$		0.07	1.0	$\mu$ A
Off-state leakage current (NO, NC)	$I_F = 0$ mA (NO), $I_F = 5.0$ mA (NC), $V_L = \pm 200$ V	$I_O$			1.0	$\mu$ A
Output capacitance (NO)	$I_F = 0$ mA, $V_L = 50$ V	$C_O$		50		pF
Output capacitance (NC)	$I_F = 5.0$ mA, $V_L = 50$ V	$C_O$		50		pF
<b>TRANSFER</b>						
Capacitance (input to output)	$V_{ISO} = 1.0$ V	$C_{IO}$		3.0		pF
Turn-on time (NO)	$I_F = 10$ mA, $I_L = 37.5$ mA, $V_L = 150$ V	$t_{on}$	0.2	3.2	6.0	ms
Turn-on time (NC)	$I_F = 10$ mA, $I_L = 37.5$ mA, $V_L = 150$ V	$t_{on}$	0.2	3.8	6.0	ms
Turn-off time (NO)	$I_F = 10$ mA, $I_L = 37.5$ mA, $V_L = 150$ V	$t_{off}$		1.6	3.0	ms
Turn-off time (NC)	$I_F = 10$ mA, $I_L = 37.5$ mA, $V_L = 150$ V	$t_{off}$		0.8	3.0	ms

## Note

$T_{amb} = 25$  °C, unless otherwise specified.

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.



# LH1502BAC, LH1502BACTR, LH1502BB

Dual 1 Form A/B, C Solid State Relay Vishay Semiconductors

## TYPICAL CHARACTERISTICS

T<sub>amb</sub> = 25 °C, unless otherwise specified

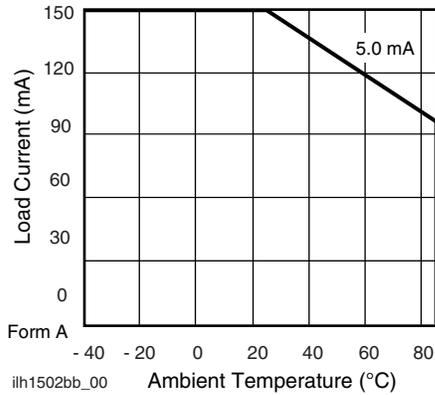


Fig. 1 - Recommended Operating Conditions

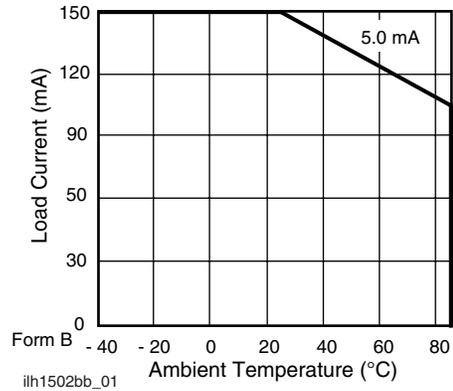
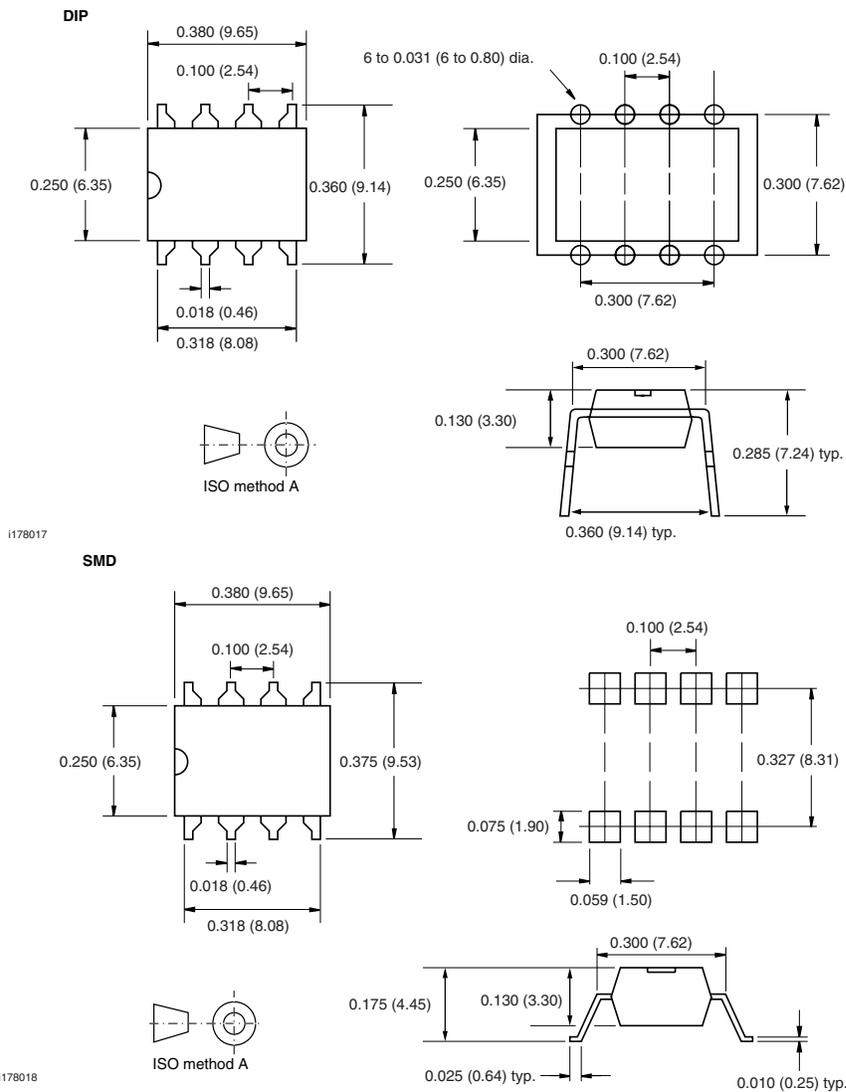


Fig. 2 - Recommended Operating Conditions

## PACKAGE DIMENSIONS in inches (millimeters)





## **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 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.

We reserve the right to make changes to improve technical design  
and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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