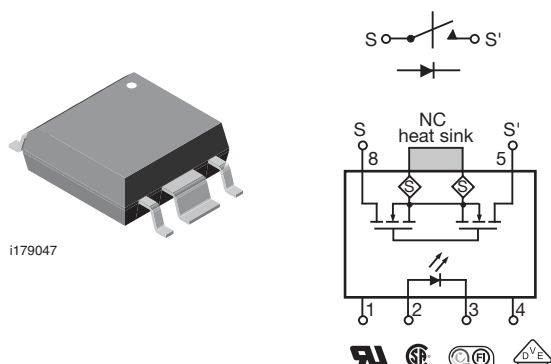


1 Form A SOP Solid-State Relay



RoHS
COMPLIANT

FEATURES

- High-speed operation
- Isolation test voltage 2500 V_{RMS}
- Current-limit protection
- High surge capability
- Clean, bounce-free switching
- Extremely low power consumption
- High-reliability monolithic detector
- Surface-mountable
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

APPLICATIONS

- PCMCIA type 2 cards
- Battery powered switch applications
- General telecom switching
 - On/off hook
 - Ring relay
 - Ground start
- Programmable controllers
- Instrumentation

DESCRIPTION

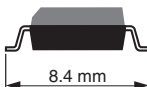
The LH1540 relay is an SPST normally open switch (1 form A) in small-outline packages (SOP). It requires a minimal amount of LED drive current to operate, making them ideal for battery powered and power consumption sensitive applications.

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 BCDMOS technology, is comprised of a photodiode array, switch-control circuitry, and MOSFET switches. In addition, the relays employ current-limiting circuitry enabling it to pass lightning surge testing as per ANSI/TIA-968-B and other regulatory surge requirements when overvoltage protection is provided.

AGENCY APPROVALS

UL1577: file no. E52744 system code S
 CSA: certification 093751
 DIN EN: 60747-5-2 (VDE 0884)/60747-5-5 (pending), available with option 1
 FIMKO: approval

ORDERING INFORMATION

L H 1 5 4 0 A C D T R PART NUMBER ELECTR. VARIATION PACKAGE CONFIG. TAPE AND REEL											SOP-#  8.4 mm
PACKAGE						UL, CSA, FIMKO					
SOP-8, tubes						LH1540ACD					
SOP-8, tape and reel						LH1540ACDTR					



ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
LED input ratings: continuous forward current		I_F	50	mA
LED input ratings: reverse voltage		V_R	5	V
OUTPUT				
Output operation: DC or peak ac load voltage	$I_L \leq 50\text{ }\mu\text{A}$	V_L	350	V
Continuous DC load current: one pole operating		I_L	110	mA
SSR				
Ambient operating temperature range		T_{amb}	- 40 to + 85	$^{\circ}\text{C}$
Storage temperature range		T_{stg}	- 55 to + 150	$^{\circ}\text{C}$
Pin soldering temperature	$t = 5\text{ s max}$	T_{sld}	260	$^{\circ}\text{C}$
Input/output isolation voltage		V_{ISO}	2500	V_{RMS}
Power dissipation		P_{diss}	550	mW
Thermal resistance, junction to ambient		R_{thja}	200	C/W

Note

- 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.

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
LED forward current for switch turn-on	$I_L = 100\text{ mA}$, $t = 10\text{ ms}$	I_{Fon}		0.6	1	mA
LED forward current for switch turn-off	$V_L = \pm 300\text{ V}$, $t = 100\text{ ms}$	I_{Foff}	0.001	0.1		mA
LED forward voltage	$I_F = 1.5\text{ mA}$	V_F	0.80	1.15	1.40	V
OUTPUT						
On-resistance: pin 5 ($\pm$) to 8 ($\pm$)	$I_F = 1.5\text{ mA}$, $I_L = \pm 50\text{ mA}$	R_{ON}	12	18	25	Ω
Current limit	$I_F = 1.5\text{ mA}$, $t = 5\text{ ms}$, $V_L = 7\text{ V}$	I_{LMT}	170	210	270	mA
Output off-state leakage current	$I_F = 0\text{ mA}$, $V_L = \pm 100\text{ V}$			0.7	200	nA
	$I_F = 0\text{ mA}$, $V_L = \pm 350\text{ V}$				1	μA

Note

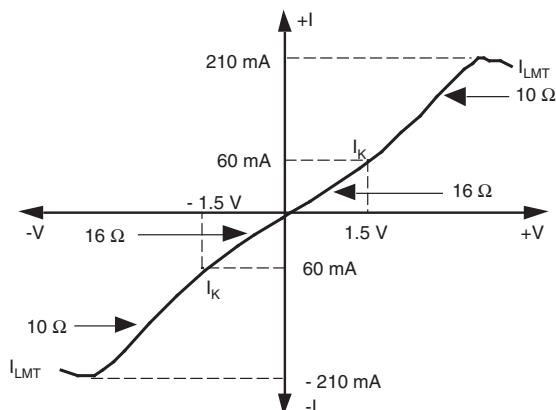
- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information only and are not part of the testing requirements.

SWITCHING CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Turn-on time	$I_F = 1.5\text{ mA}$, $I_L = 50\text{ mA}$	t_{on}		0.6		ms
	$I_F = 5\text{ mA}$, $I_L = 50\text{ mA}$	t_{on}		0.3	1	ms
Turn-off time	$I_F = 1.5\text{ mA}$, $I_L = 50\text{ mA}$	t_{off}		0.7		ms
	$I_F = 5\text{ mA}$, $I_L = 50\text{ mA}$	t_{off}		0.7	1.2	ms

RECOMMENDED OPERATING CONDITIONS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
LED forward current for switch turn-on	$T_{amb} = - 40\text{ }^{\circ}\text{C}$ to + 85 $^{\circ}\text{C}$	I_{Fon}	1.5		20	mA

FUNCTIONAL DESCRIPTION

Figure 1 shows the switch characteristics of the relays. The relay exhibits an on-resistance that is exceptionally linear through the origin and up to the knee current (I_K). Beyond I_K , the incremental resistance decreases, minimizing internal power dissipation. Overload currents are clamped at I_{LMT} by the internal current-limit circuitry. The current-limiting circuitry exhibits a negative temperature coefficient, thereby reducing the current-limit value when relay temperature is increased. An extended clamp condition, which increases relay temperature, decreases the current-limit value, resulting in a current fold back characteristic. When the overload is removed, the relay resumes its normal on-resistance characteristic.

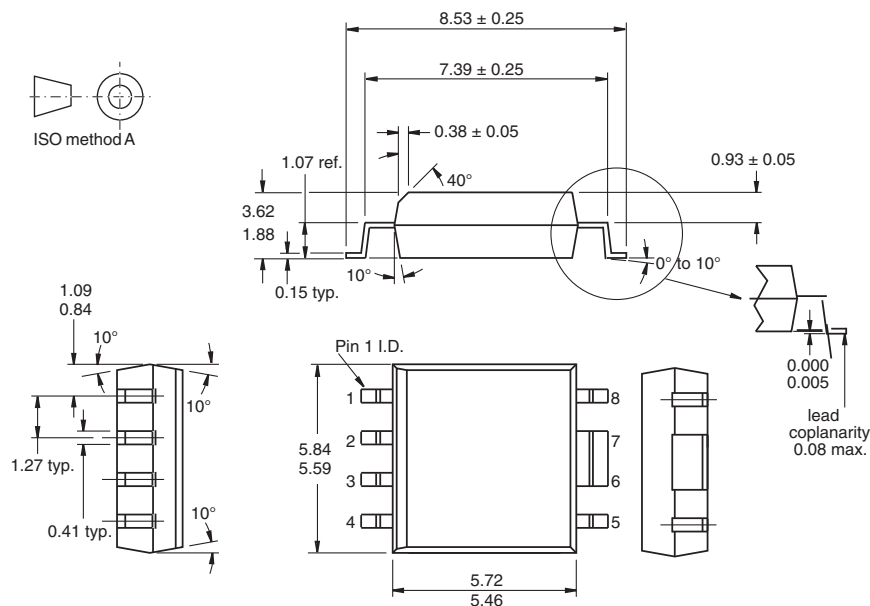


ilh1540acd_01

Fig. 1 - Typical AC/DC on Characteristics

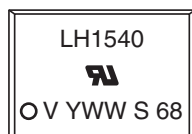
In a 1 form A relay, to turn the relay on, forward current is applied to the LED. The amount of current applied determines the amount of light produced for the photodiode array. This photodiode array develops a drive voltage for the MOSFET switch outputs. For high temperature or high-load current operations, more LED current is required.

PACKAGE DIMENSIONS in millimeters



i178023

PACKAGE MARKING (example)



Note

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



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.