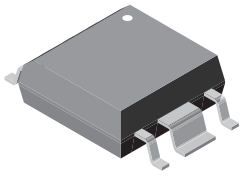
1 Form A SOP Solid-State Relay



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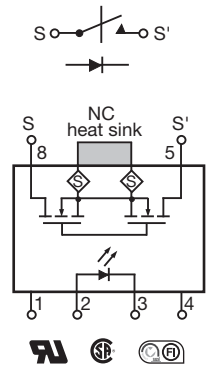

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FEATURES

- 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

Pb-free

e3

RoHS COMPLIANT

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 FCC 68.302 and other regulatory surge requirements when overvoltage protection is provided.

APPLICATIONS

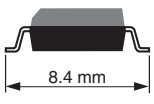
- PCMCIA type 2 cards
- Battery powered switch applications
- General telecom switching
- Telephone line interface
  - On/off hook
  - Ring relay
  - Ground start
- Programmable controllers
- Instrumentation

AGENCY APPROVALS

UL1577: file no. E52744 system code S
CSA: certification 093751
FIMKO: approval

ORDERING INFORMATION

L	H	1	5	4	0	A	C	D	T	R
PART NUMBER						ELECTR. VARIATION	PACKAGE CONFIG.		TAPE AND REEL	



PACKAGE	UL, CSA, FIMKO
SOP-8, tubes	LH1540ACD
SOP-8, tape and reel	LH1540ACDTR

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °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	$I_L \leq 50$ µA	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	°C
Storage temperature range		T_{stg}	- 55 to + 150	°C
Pin soldering temperature	t = 5 s max	T_{sld}	260	°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 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
LED forward current for switch turn-on	I_L = 100 mA, t = 10 ms	I_{Fon}		0.6	1	mA
LED forward current for switch turn-off	V_L = ± 300 V, t = 100 ms	I_{Foff}	0.001	0.1		mA
LED forward voltage	I_F = 1.5 mA	V_F	0.80	1.15	1.40	V
OUTPUT						
On-resistance: pin 5 (±) to 8 (±)	I_F = 1.5 mA, I_L = ± 50 mA	R_{ON}	12	18	25	Ω
Current limit	I_F = 1.5 mA, t = 5 ms, V_L = 7 V	I_{LMT}	170	210	270	mA
Output off-state leakage current	I_F = 0 mA, V_L = ± 100 V			0.7	200	nA
	I_F = 0 mA, V_L = ± 350 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 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Turn-on time	I_F = 1.5 mA, I_L = 50 mA	t_{on}		0.6		ms
	I_F = 5 mA, I_L = 50 mA	t_{on}		0.3	1	ms
Turn-off time	I_F = 1.5 mA, I_L = 50 mA	t_{off}		0.7		ms
	I_F = 5 mA, I_L = 50 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 °C to + 85 °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.

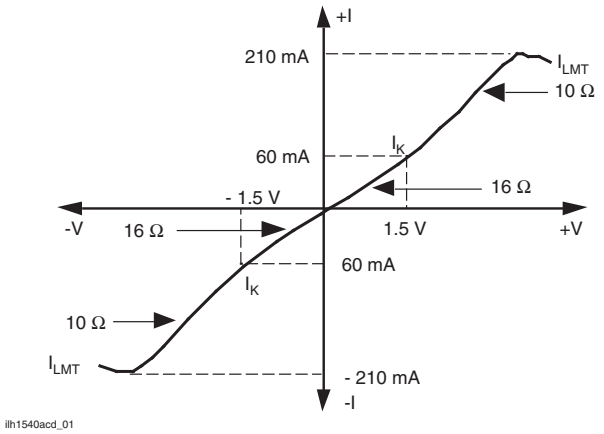
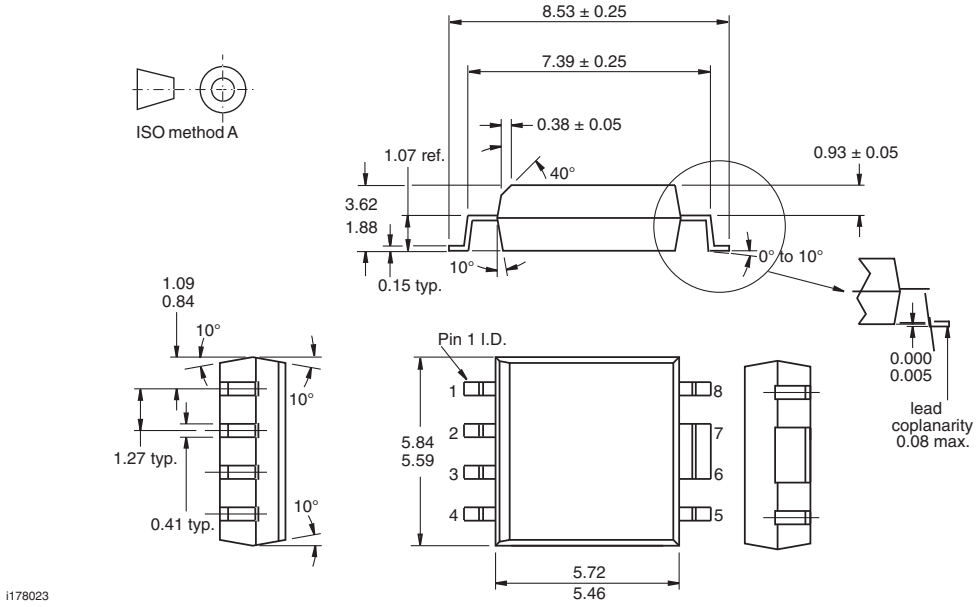


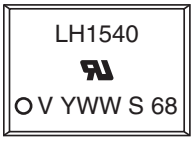
Fig. 1 - Typical AC/DC on Characteristics

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



PACKAGE MARKING (example)



Note

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

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