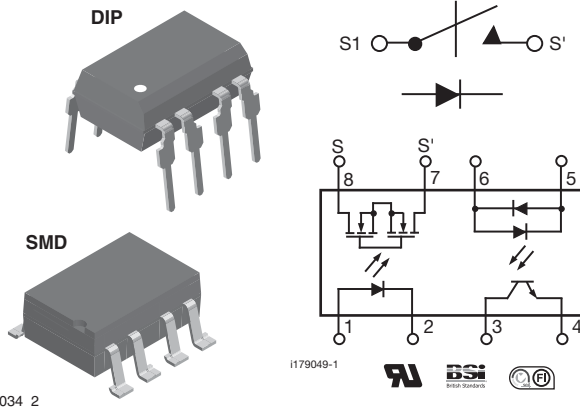




# Telecom Switch 1 Form A Solid-State Relay



RoHS COMPLIANT

## FEATURES

- Solid state relay and optocoupler in one package
- Surface mount package
- I/O isolation, 5300 V<sub>RMS</sub>
- LH1529A, CTR Min. = 33 %
- LH1529B, CTR Min. = 100 %
- Optocoupler
  - Bidirectional current detection
- Solid-state relay (equivalent to TS117P)
  - Typical R<sub>ON</sub> 20 Ω
  - Load voltage 350 V
  - Load current 120 mA
  - Current limit protection
  - High surge capability
  - Clean bounce free switching
  - Low power consumption
  - High reliability monolithic receptor
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

## DESCRIPTION

The LH1529A and LH1529B telecom switches consist of an optically coupled solid state relay (SSR) and bidirectional input optocoupler. The SSR is ideal for performing switch hook and dial-pulse switching whilst optocoupler performs ring detection and loop current sensing functions. Both the SSR and optocoupler have an isolation test voltage of 5300 V<sub>RMS</sub>.

## AGENCY APPROVALS

- UL1577: file no. E52744 system code H, double protection
- BSI/BABT: certification no. 7980
- FIMKO: approval

## APPLICATIONS

- General telecom switching
  - On/off hook control
  - Dial pulse
  - Ring current detection
  - Loop current sensing

### Note

- See “solid-state relays” (application note 56)

ORDERING INFORMATION													
L	H	1	5	2	9	#	#	#	T	R			
PART NUMBER						ELECTR. VARIATION	PACKAGE CONFIG.			TAPE AND REEL			
<b>PACKAGE</b>						<b>UL, BSI, FIMKO</b>							
SMD-8, tubes						LH1529AAC							
SMD-8, tape and reel						LH1529AACTR							
SMD-8, tubes						LH1529BAC							
SMD-8, tape and reel						LH1529BACTR							
DIP-8, tubes						LH1529BB							



ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>SSR</b>				
<b>INPUT</b>				
LED continuous forward current		I <sub>F</sub>	50	mA
LED reverse voltage	I <sub>R</sub> ≤ 10 μA	V <sub>R</sub>	5	V
<b>OUTPUT</b>				
DC or peak AC load voltage	I <sub>L</sub> ≤ 50 μA	V <sub>L</sub>	350	V
Continuous DC load current		I <sub>L</sub>	120	mA
<b>SSR</b>				
Total power dissipation		P <sub>diss</sub>	600	mW
Ambient temperature range		T <sub>amb</sub>	- 40 to + 85	°C
Storage temperature range		T <sub>stg</sub>	- 40 to + 150	°C
Soldering temperature <sup>(1)</sup>	t = 10 s max.	T <sub>sld</sub>	260	°C
Isolation test voltage (for 1 s)		V <sub>ISO</sub>	5300	V <sub>RMS</sub>
Isolation resistance	V <sub>IO</sub> = 500 V, T <sub>amb</sub> = 25 °C	R <sub>IO</sub>	≥ 10 <sup>12</sup>	Ω
	V <sub>IO</sub> = 500 V, T <sub>amb</sub> = 100 °C	R <sub>IO</sub>	≥ 10 <sup>11</sup>	Ω
<b>OPTOCOUPLER</b>				
<b>INPUT</b>				
LED continuous forward current		I <sub>F</sub>	50	mA
LED reverse voltage	I <sub>R</sub> ≤ 10 μA	V <sub>R</sub>	5	V
<b>OUTPUT</b>				
Collector emitter breakdown voltage		BV <sub>CEO</sub>	30	V
Phototransistor power dissipation		P <sub>diss</sub>	150	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).

ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>SSR</b>							
<b>INPUT</b>							
LED forward current switch turn-on	I <sub>L</sub> = 100 mA, t = 10 ms		I <sub>Fon</sub>		0.7	2	mA
LED forward current switch turn-off	V <sub>L</sub> = ± 300 V		I <sub>Foff</sub>	0.2	0.6		mA
LED forward voltage	I <sub>F</sub> = 10 mA		V <sub>F</sub>	1.15	1.26	1.45	V
<b>OUTPUT</b>							
On-resistance AC/DC, pins 4 (±) to 6 (±)	I <sub>F</sub> = 5 mA, I <sub>L</sub> = ± 50 mA		R <sub>ON</sub>	12	20	25	Ω
Current limit	I <sub>F</sub> = 5 mA, t = 5 ms, V <sub>L</sub> = ± 6 V	LH1529AAC, LH1529AACTR	I <sub>limit</sub>	230	260	370	mA
		LH1529BB	I <sub>limit</sub>	170	210	250	mA
		LH1529BAC, LH1529BACTR	I <sub>limit</sub>	170	210	250	mA
Off-state leakage current	I <sub>F</sub> = 0 mA, V <sub>L</sub> = ± 100 V		I <sub>O</sub>		0.02	200	nA
	I <sub>F</sub> = 0 mA, V <sub>L</sub> = ± 350 V		I <sub>O</sub>			1	μA
Output capacitance pin 7 to pin 8	I <sub>F</sub> = 0 mA, V <sub>L</sub> = 1 V		C <sub>O</sub>		55		pF
	I <sub>F</sub> = 0 mA, V <sub>L</sub> = 50 V		C <sub>O</sub>		10		pF
Capacitance (input to output)	V <sub>ISO</sub> = 1 V		C <sub>IO</sub>		1.3		pF



ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>OPTOCOUPLER</b>							
LED forward current	I <sub>F</sub> = 10 mA		V <sub>F</sub>	0.9	1.2	1.5	V
Saturation voltage	I <sub>F</sub> = 16 mA, I <sub>C</sub> = 2 mA		V <sub>CEsat</sub>		0.7	0.5	V
Collector emitter dark current	I <sub>F</sub> = 0 mA, V <sub>CE</sub> = 5 V		I <sub>CEO</sub>			500	nA
Trickle current leakage	I <sub>F</sub> = 5 μA, V <sub>CE</sub> = 5 V		I <sub>CEO</sub>			1	μA
DC current transfer ratio	I <sub>F</sub> = 6 mA, V <sub>CE</sub> = 0.5 V	LH1529AAC, LH1529AACTR	CTR <sub>DC</sub>	33	100		%
		LH1529BB	CTR <sub>DC</sub>	100	165		%
		LH1529BAC, LH1529BACTR	CTR <sub>DC</sub>	100	165		%

**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 <sub>amb</sub> = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Turn-on time	I <sub>F</sub> = 5 mA, I <sub>L</sub> = 50 mA	LH1529AAC, LH1529AACTR	t <sub>on</sub>		2	3	ms
		LH1529BB	t <sub>on</sub>		1.3	2.5	ms
		LH1529BAC, LH1529BACTR	t <sub>on</sub>		1.3	2.5	ms
Turn-off time	I <sub>F</sub> = 5 mA, I <sub>L</sub> = 50 mA	LH1529AAC, LH1529AACTR	t <sub>off</sub>		0.6	3	ms
		LH1529BB	t <sub>off</sub>		0.6	2.5	ms
		LH1529BAC, LH1529BACTR	t <sub>off</sub>		0.6	2.5	ms

**TYPICAL CHARACTERISTICS** (T<sub>amb</sub> = 25 °C, unless otherwise specified)

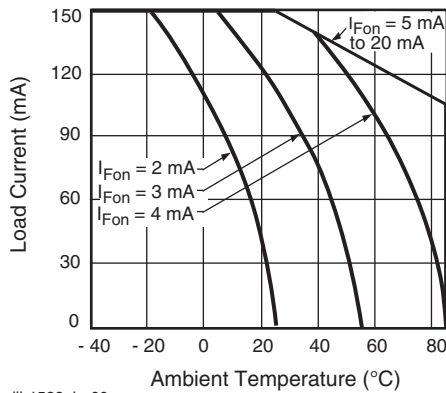


Fig. 1 - Recommended Operating Conditions

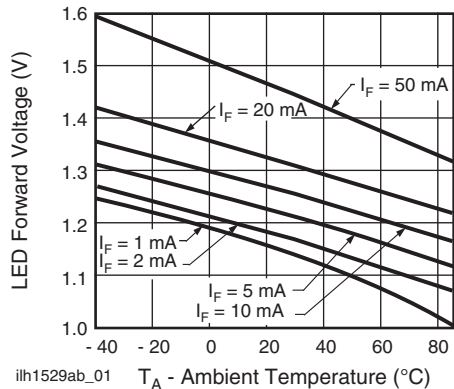


Fig. 2 - LED Voltage vs. Temperature

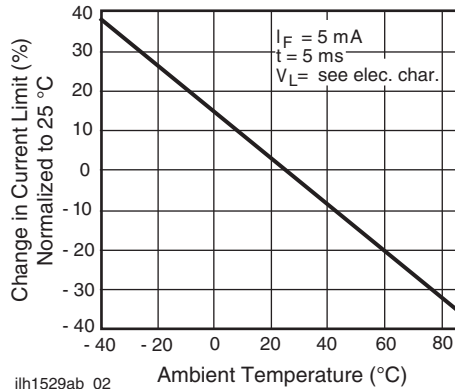


Fig. 3 - Current Limit vs. Temperature

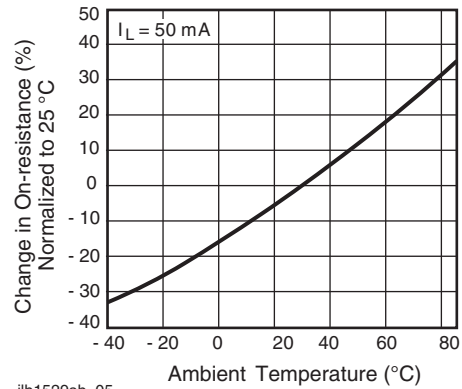


Fig. 6 - On-Resistance vs. Temperature

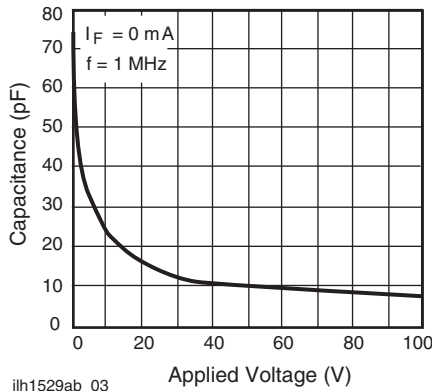


Fig. 4 - Switch Capacitance vs. Applied Voltage

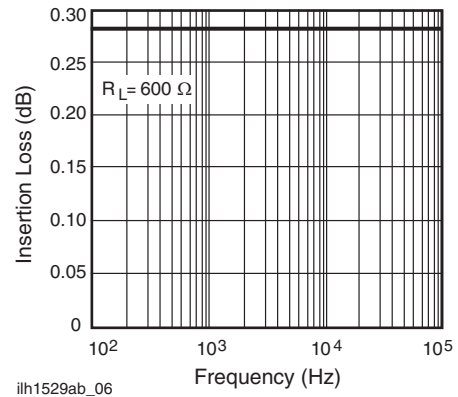


Fig. 7 - Insertion Loss vs. Frequency

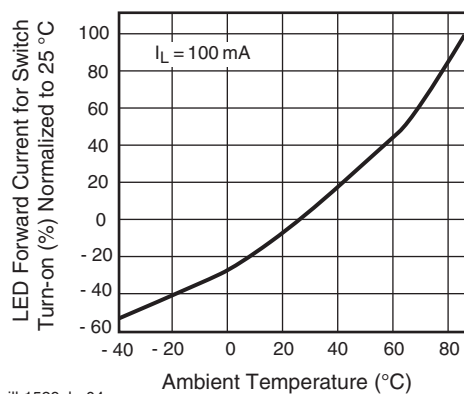


Fig. 5 - LED Current for Switch Turn-on vs. Temperature

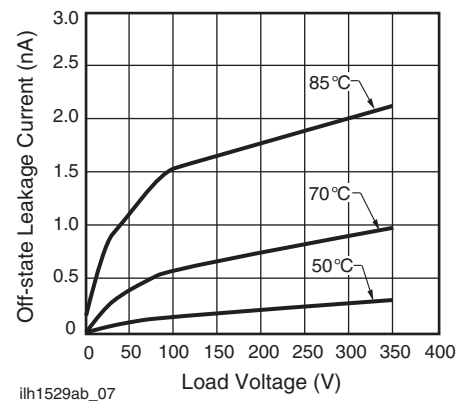


Fig. 8 - Leakage Current vs. Applied Voltage at Elevated Temperatures

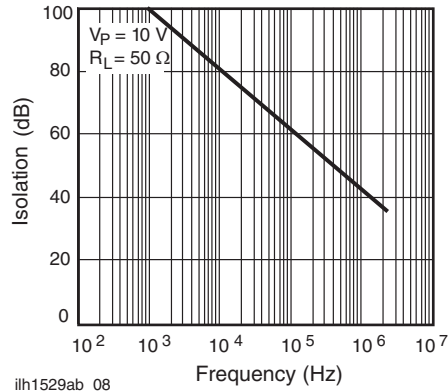


Fig. 9 - Output Isolation

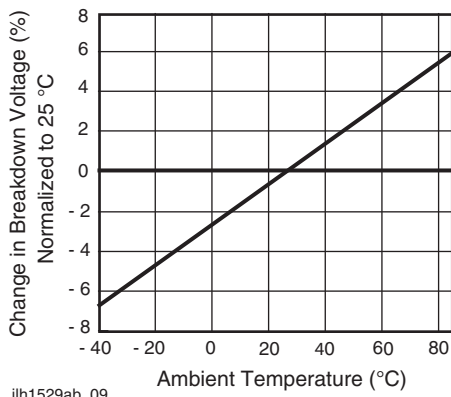


Fig. 10 - Switch Breakdown Voltage vs. Temperature

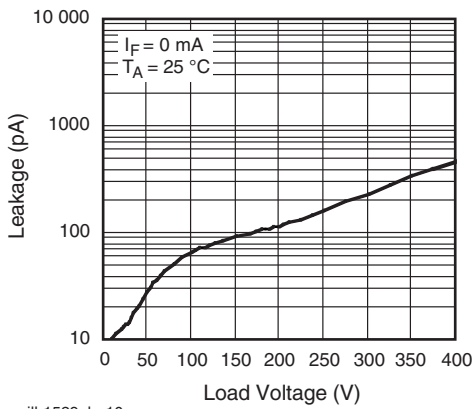
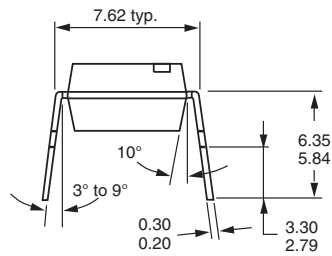
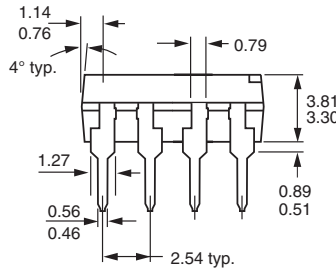
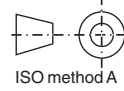
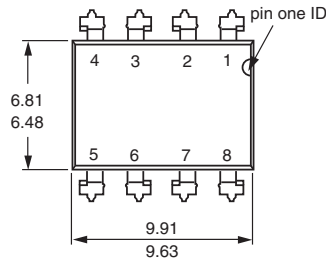


Fig. 11 - Leakage Current vs. Applied Voltage



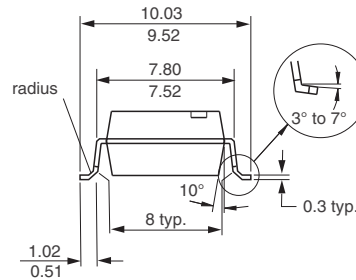
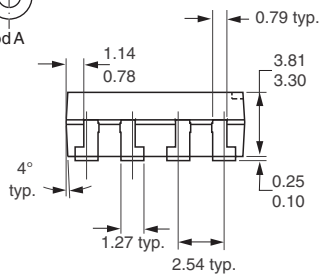
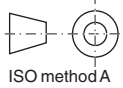
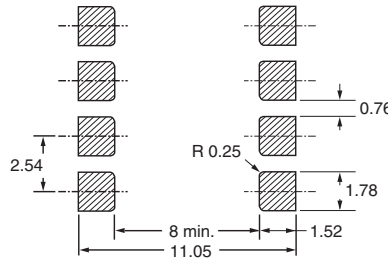
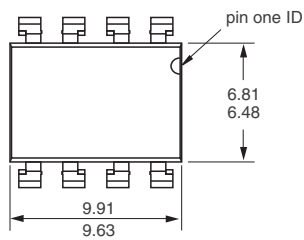
PACKAGE DIMENSIONS in millimeters

DIP



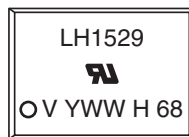
i178008

SMD



i178009

PACKAGE MARKING (example)



Note

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



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