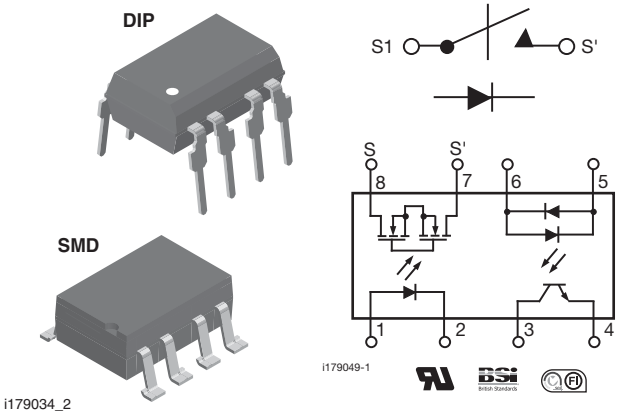
Telecom Switch 1 Form A Solid-State Relay



FEATURES

- Solid state relay and optocoupler in one package
- Surface mount package
- I/O isolation, 5300 V_{RMS}
- LH1529A, CTR Min. = 33 %
- LH1529B, CTR Min. = 100 %
- Optocoupler
  - Bidirectional current detection
- Solid-state relay (equivalent to TS117P)
  - Typical R_{ON} 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

Pb-free

e3

RoHS COMPLIANT

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_{RMS}.

AGENCY APPROVALS

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

BSI/BABT: certification no. 7980

FIMKO: approval

APPLICATIONS

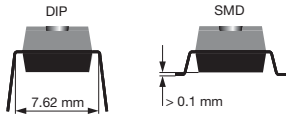
- General telecom switching
  - On/off hook control
  - Dial pulse
  - Ring current detection
  - Loop current sensing

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	



PACKAGE	UL, BSI, FIMKO
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_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
SSR				
INPUT				
LED continuous forward current		I_F	50	mA
LED reverse voltage	$I_R \leq 10$ µA	V_R	5	V
OUTPUT				
DC or peak AC load voltage	$I_L \leq 50$ µA	V_L	350	V
Continuous DC load current		I_L	120	mA
SSR				
Total power dissipation		P_{diss}	600	mW
Ambient temperature range		T_{amb}	- 40 to + 85	°C
Storage temperature range		T_{stg}	- 40 to + 150	°C
Soldering temperature (1)	t = 10 s max.	T_{sld}	260	°C
Isolation test voltage (for 1 s)		V_{ISO}	5300	V_{RMS}
Isolation resistance	V_{IO} = 500 V, T_{amb} = 25 °C	R_{IO}	$\geq 10^{12}$	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	$\geq 10^{11}$	Ω
OPTOCOUPLER				
INPUT				
LED continuous forward current		I_F	50	mA
LED reverse voltage	$I_R \leq 10$ µA	V_R	5	V
OUTPUT				
Collector emitter breakdown voltage		BV_{CEO}	30	V
Phototransistor power dissipation		P_{diss}	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.

(1) 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_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
SSR							
INPUT							
LED forward current switch turn-on	I_L = 100 mA, t = 10 ms		I_{Fon}		0.7	2	mA
LED forward current switch turn-off	V_L = ± 300 V		I_{Foff}	0.2	0.6		mA
LED forward voltage	I_F = 10 mA		V_F	1.15	1.26	1.45	V
OUTPUT							
On-resistance AC/DC, pins 4 (±) to 6 (±)	I_F = 5 mA, I_L = ± 50 mA		R_{ON}	12	20	25	Ω
Current limit	I_F = 5 mA, t = 5 ms, V_L = ± 6 V	LH1529AAC, LH1529AACTR	I_{limit}	230	260	370	mA
		LH1529BB	I_{limit}	170	210	250	mA
		LH1529BAC, LH1529BACTR	I_{limit}	170	210	250	mA
Off-state leakage current	I_F = 0 mA, V_L = ± 100 V		I_O		0.02	200	nA
	I_F = 0 mA, V_L = ± 350 V		I_O			1	µA
Output capacitance pin 7 to pin 8	I_F = 0 mA, V_L = 1 V		C_O		55		pF
	I_F = 0 mA, V_L = 50 V		C_O		10		pF
Capacitance (input to output)	V_{ISO} = 1 V		C_{IO}		1.3		pF

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
OPTOCOUPLER							
LED forward current	I_F = 10 mA		V_F	0.9	1.2	1.5	V
Saturation voltage	I_F = 16 mA, I_C = 2 mA		V_{CEsat}		0.7	0.5	V
Collector emitter dark current	I_F = 0 mA, V_{CE} = 5 V		I_{CEO}			500	nA
Trickle current leakage	I_F = 5 µA, V_{CE} = 5 V		I_{CEO}			1	µA
DC current transfer ratio	I_F = 6 mA, V_{CE} = 0.5 V	LH1529AAC, LH1529AACTR	CTR_{DC}	33	100		%
		LH1529BB	CTR_{DC}	100	165		%
		LH1529BAC, LH1529BACTR	CTR_{DC}	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_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Turn-on time	I_F = 5 mA, I_L = 50 mA	LH1529AAC, LH1529AACTR	t_{on}		2	3	ms
		LH1529BB	t_{on}		1.3	2.5	ms
		LH1529BAC, LH1529BACTR	t_{on}		1.3	2.5	ms
Turn-off time	I_F = 5 mA, I_L = 50 mA	LH1529AAC, LH1529AACTR	t_{off}		0.6	3	ms
		LH1529BB	t_{off}		0.6	2.5	ms
		LH1529BAC, LH1529BACTR	t_{off}		0.6	2.5	ms

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

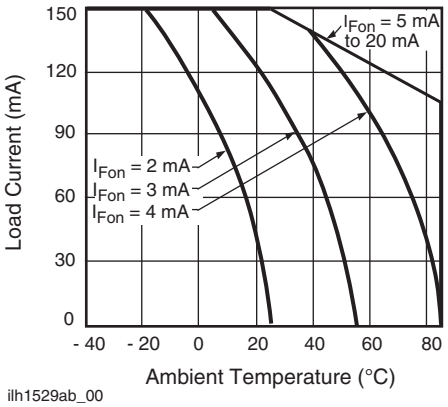


Fig. 1 - Recommended Operating Conditions

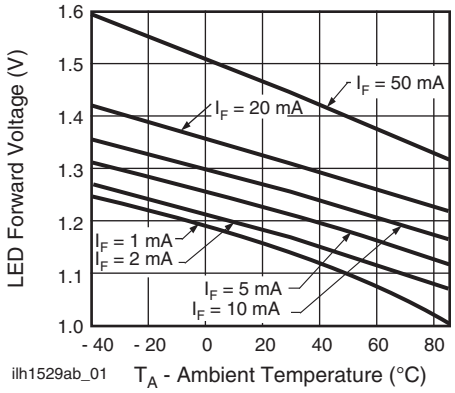


Fig. 2 - LED Voltage vs. Temperature

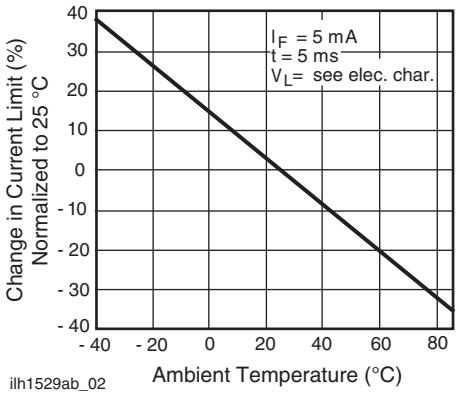


Fig. 3 - Current Limit vs. Temperature

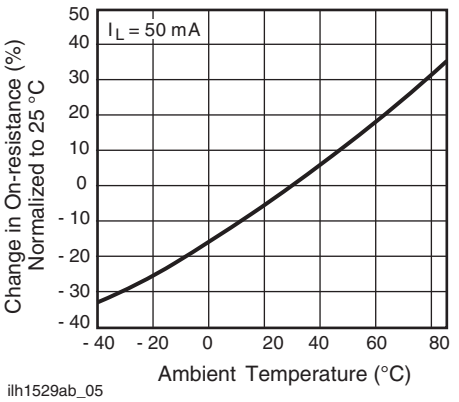


Fig. 6 - On-Resistance vs. Temperature

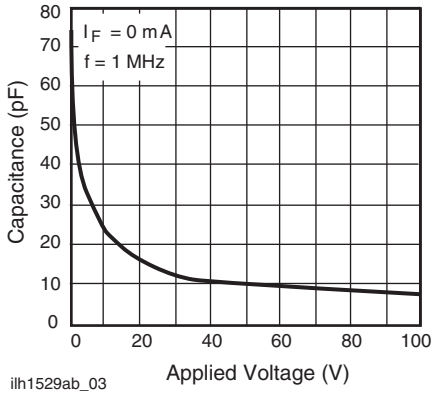


Fig. 4 - Switch Capacitance vs. Applied Voltage

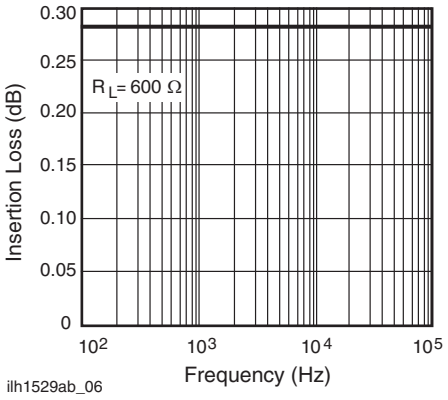


Fig. 7 - Insertion Loss vs. Frequency

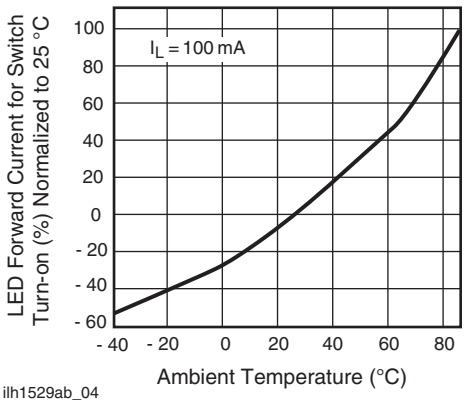


Fig. 5 - LED Current for Switch Turn-on vs. Temperature

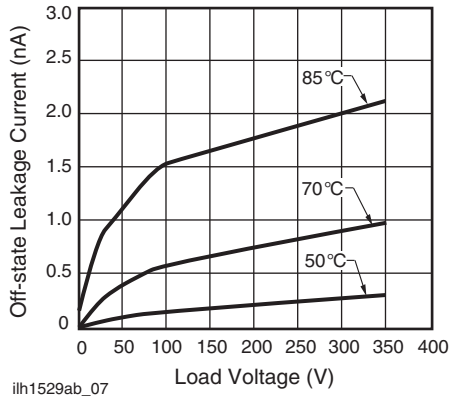


Fig. 8 - Leakage Current vs.
Applied Voltage at Elevated Temperatures

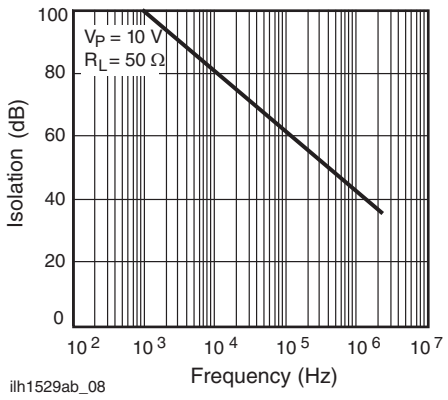


Fig. 9 - Output Isolation

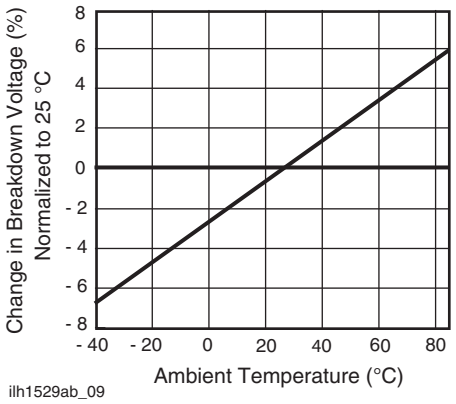


Fig. 10 - Switch Breakdown Voltage vs. Temperature

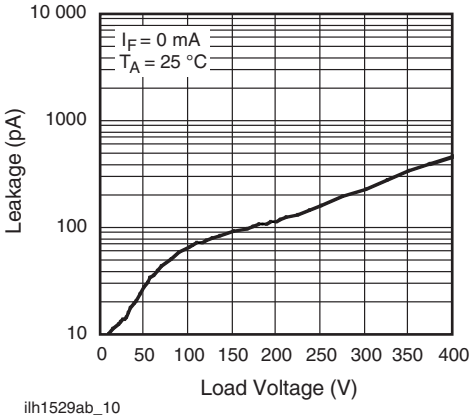
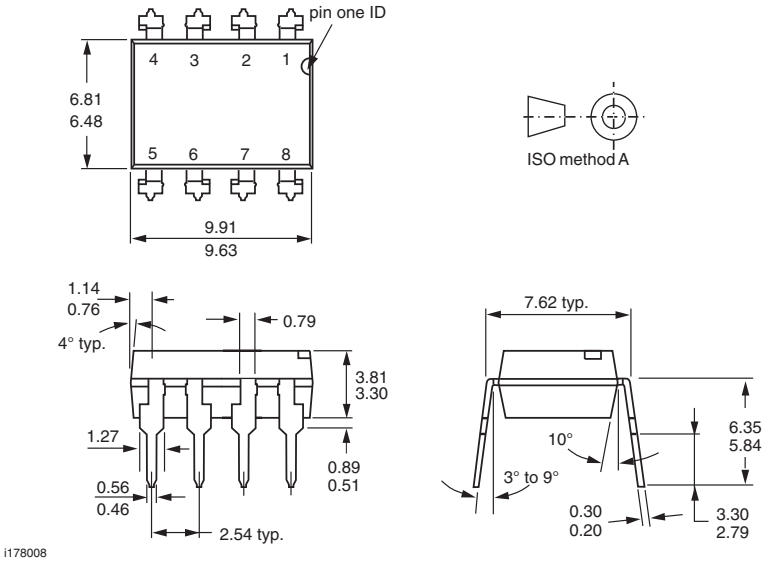


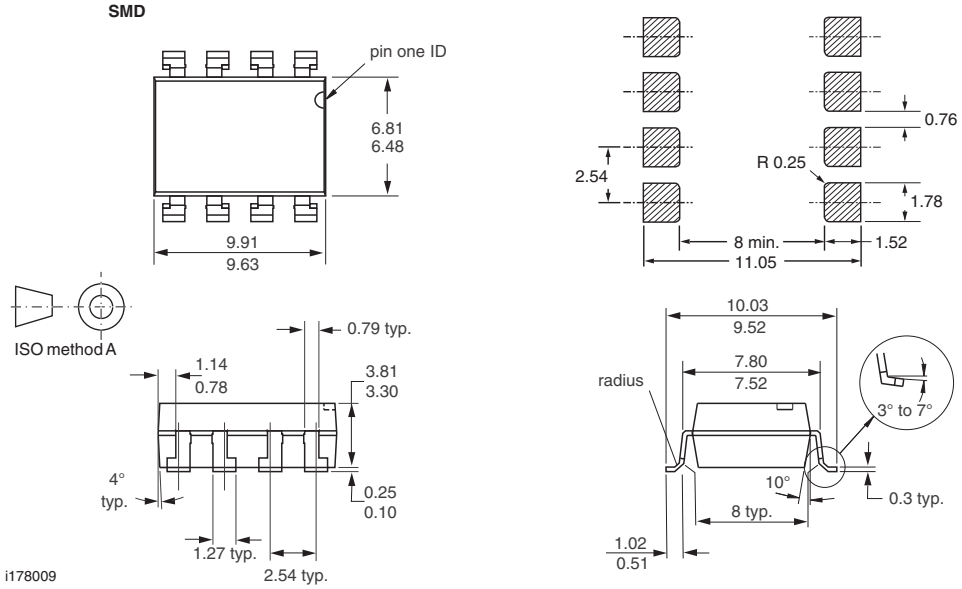
Fig. 11 - Leakage Current vs. Applied Voltage

PACKAGE DIMENSIONS in millimeters

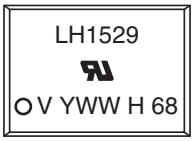
DIP



SMD



PACKAGE MARKING (example)



Note

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

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