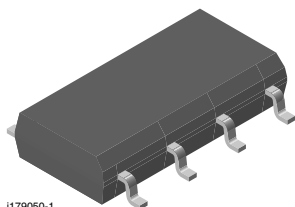
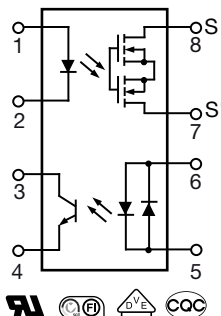


## Telecom Switch - 1 Form A Solid-State Relay



H179050-1


**RoHS**  
COMPLIANT

### DESCRIPTION

The LH1529FP and LH1529GP telecom switches consist of an optically coupled solid-state relay (SSR) and a bidirectional input optocoupler. The SSR is ideal for performing switch hook and dial-pulse switching while the optocoupler performs ring detection and loop current sensing functions. Both the SSR and optocoupler provide 3000 V<sub>RMS</sub> of input to output isolation.

The SSR is integrated on a monolithic receptor die using high voltage technology. The SSR features low on resistance, high breakdown voltage and current-limit circuitry that protects the relay from telephone line induced lightning surges.

The optocoupler provides bidirectional current sensing via two anti parallel GaAs infrared emitting diodes. The opto channel provides a minimum CTR of 33 % at 6 mA.

The LH1529FP and LH1529GP come in an 8 pin, 0.080" thick plastic flat pak, SMD.

### FEATURES

- Solid-state relay and optocoupler in one package
- Surface mount package - new flat pak
- Isolation test voltage, 3000 V<sub>RMS</sub>
- LH1529FP, CTR min. = 33 %
- LH1529GP, 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 detector
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

### APPLICATIONS

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

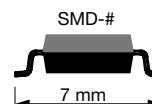
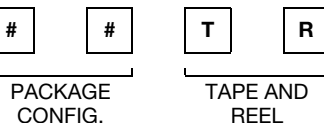
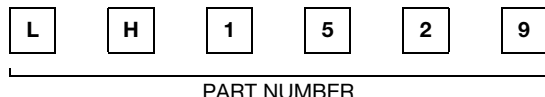
### Note

- See "solid-state relays" (application note 56)

### AGENCY APPROVALS

- UL1577, file no. E52744 system code O, double protection
- DIN EN 60747-5-5 (VDE 0884)
- FIMKO
- CQC GB4943.1-2011 (suitable for installation altitude below 2000 m)

### ORDERING INFORMATION



| PACKAGE              | UL, FIMKO  |
|----------------------|------------|
| SMD-8, tape and reel | LH1529FPTR |
| SMD-8, tubes         | LH1529GP   |
| SMD-8, tape and reel | LH1529GPTR |



| ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |  |            |                |                    |
|---|--|------------|----------------|--------------------|
| PARAMETER   | TEST CONDITION   | SYMBOL     | VALUE          | UNIT               |
| <b>SSR</b>  |  |            |                |                    |
| <b>INPUT</b>  |  |            |                |                    |
| LED continuous forward current  |  | $I_F$      | 50             | mA                 |
| LED reverse voltage   | $I_R \leq 10\text{ }\mu\text{A}$                               | $V_R$      | 6              | V                  |
| <b>OUTPUT</b>   |  |            |                |                    |
| DC or peak AC load voltage  | $I_L \leq 50\text{ }\mu\text{A}$                               | $V_L$      | 350            | V                  |
| Continuous DC load current  |  | $I_L$      | 120            | mA                 |
| <b>SSR</b>  |  |            |                |                    |
| Ambient temperature range   |  | $T_{amb}$  | - 40 to + 85   | $^{\circ}\text{C}$ |
| Storage temperature range   |  | $T_{stg}$  | - 40 to + 125  | $^{\circ}\text{C}$ |
| Soldering temperature <sup>(1)</sup>  | $t = 10\text{ s max.}$   | $T_{sld}$  | 260            | $^{\circ}\text{C}$ |
| Isolation test voltage (for 1 s)  |  | $V_{ISO}$  | 3000           | $V_{RMS}$          |
| Isolation resistance  | $V_{IO} = 500\text{ V}, T_{amb} = 25\text{ }^{\circ}\text{C}$  | $R_{IO}$   | $\geq 10^{12}$ | $\Omega$           |
|   | $V_{IO} = 500\text{ V}, T_{amb} = 100\text{ }^{\circ}\text{C}$ | $R_{IO}$   | $\geq 10^{11}$ | $\Omega$           |
| Power dissipation   |  | $P_{diss}$ | 600            | mW                 |
| <b>Optocoupler</b>  |  |            |                |                    |
| <b>INPUT</b>  |  |            |                |                    |
| LED continuous forward current  |  | $I_F$      | 50             | mA                 |
| LED reverse voltage   | $I_R \leq 10\text{ }\mu\text{A}$                               | $V_R$      | 6              | V                  |
| <b>OUTPUT</b>   |  |            |                |                    |
| 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.

<sup>(1)</sup> Refer to reflow profile for soldering conditions for surface mounted devices.

| ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |   |                         |             |      |      |      |               |
|---|---|-------------------------|-------------|------|------|------|---------------|
| PARAMETER   | TEST CONDITION                                    | PART                    | SYMBOL      | MIN. | TYP. | MAX. | UNIT          |
| <b>SSR</b>  |   |                         |             |      |      |      |               |
| <b>INPUT</b>  |   |                         |             |      |      |      |               |
| LED forward current, switch turn-on   | $I_L = 100\text{ mA}, t = 10\text{ ms}$           |                         | $I_{Fon}$   |      | 1.1  | 3    | mA            |
| LED forward current, switch turn-off  | $V_L = \pm 300\text{ V}$                          |                         | $I_{Foff}$  | 0.2  | 1    |      | mA            |
| LED forward voltage   | $I_F = 10\text{ mA}$                              |                         | $V_F$       | 1    | 1.2  | 1.5  | V             |
| <b>OUTPUT</b>   |   |                         |             |      |      |      |               |
| On-resistance   | $I_F = 5\text{ mA}, I_L = \pm 50\text{ mA}$       |                         | $R_{ON}$    |      | 20   | 25   | $\Omega$      |
| Off-resistance  | $I_F = 0\text{ mA}, V_L = \pm 100\text{ V}$       |                         | $R_{OFF}$   |      | 5000 |      | $G\Omega$     |
| Current limit   | $I_F = 5\text{ mA}, t = 5\text{ ms}$              |                         | $I_{Limit}$ | 170  | 210  | 250  | mA            |
| Output off-state leakage current  | $I_F = 0\text{ mA}, V_L = \pm 100\text{ V}$       |                         | $I_O$       |      | 0.6  | 200  | nA            |
|   | $I_F = 0\text{ mA}, V_L = \pm 350\text{ V}$       |                         | $I_O$       |      |      | 1    | $\mu\text{A}$ |
| Output capacitance pin 7 to pin 8   | $I_F = 0\text{ mA}, V_L = 1\text{ V}$             |                         | $C_O$       |      | 55   |      | pF            |
|   | $I_F = 0\text{ mA}, V_L = 50\text{ V}$            |                         | $C_O$       |      | 10   |      | pF            |
| <b>OPTOCOUPLER</b>  |   |                         |             |      |      |      |               |
| LED forward current   | $I_F = 10\text{ mA}$                              |                         | $V_F$       | 0.9  | 1.2  | 1.5  | V             |
| Saturation voltage  | $I_F = 16\text{ mA}, I_C = 2\text{ mA}$           |                         | $V_{CEsat}$ |      | 0.07 | 0.5  | V             |
| Dark current leakage  | $I_F = 0\text{ mA}, V_{CE} = 5\text{ V}$          |                         | $I_{CE01}$  |      |      | 500  | nA            |
| Trickle current leakage   | $I_F = 5\text{ }\mu\text{A}, V_{CE} = 5\text{ V}$ |                         | $I_{CE02}$  |      |      | 1    | $\mu\text{A}$ |
| DC current transfer ratio   | $I_F = 6.0\text{ mA}, V_{CE} = 0.5\text{ V}$      | LH1529FP                | $CTR_{DC}$  | 33   | 150  |      | %             |
|   |   | LH1529GP,<br>LH1529GPTR | $CTR_{DC}$  | 100  | 150  |      | %             |
|   |   |                         |             |      |      |      |               |

**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 ( $T_{amb} = 25^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER     | TEST CONDITION                             | PART | SYMBOL    | MIN. | TYP. | MAX. | UNIT |
|---------------|--|------|-----------|------|------|------|------|
| Turn-on time  | $I_F = 5\text{ mA}$ , $I_L = 50\text{ mA}$ |      | $t_{on}$  |      | 1.3  | 2.5  | ms   |
| Turn-off time | $I_F = 5\text{ mA}$ , $I_L = 50\text{ mA}$ |      | $t_{off}$ |      | 0.1  | 2.5  | ms   |

## TYPICAL CHARACTERISTICS ( $T_{amb} = 25^{\circ}\text{C}$ , unless otherwise specified)

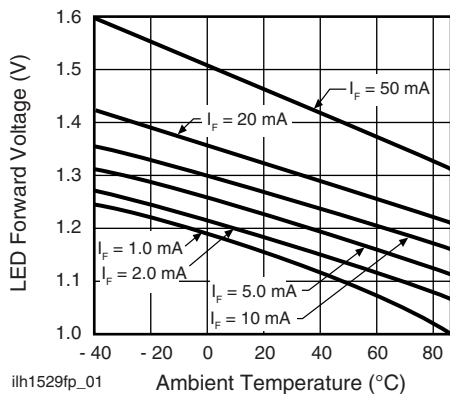


Fig. 1 - LED Voltage vs. Temperature

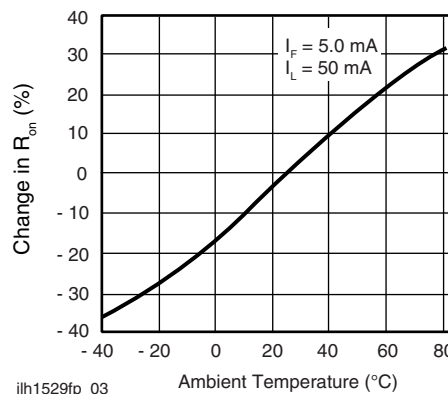


Fig. 3 - On-Resistance vs. Temperature

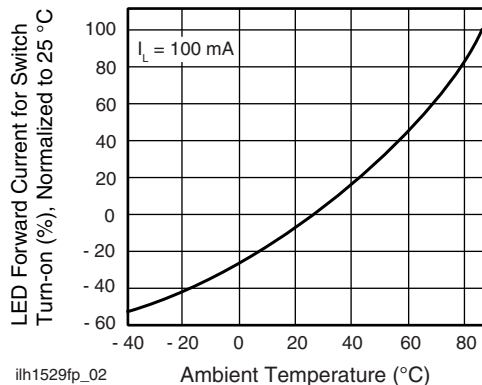


Fig. 2 - LED Current for Switch Turn-on vs. Temperature

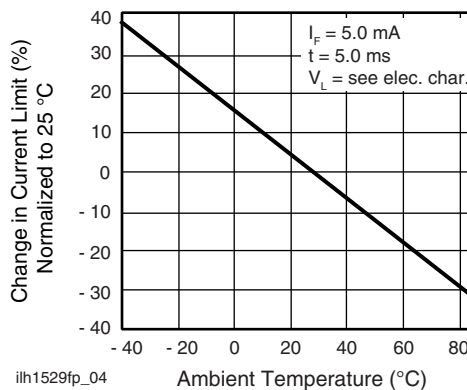


Fig. 4 - Current Limit vs. Temperature

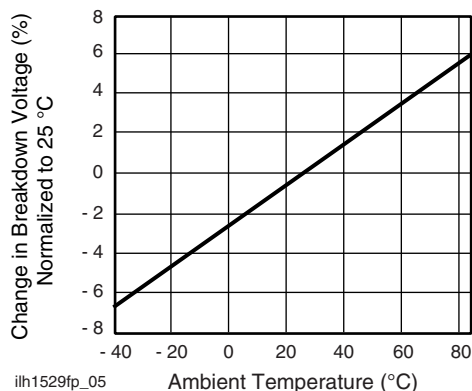


Fig. 5 - Switch Breakdown Voltage vs. Temperature

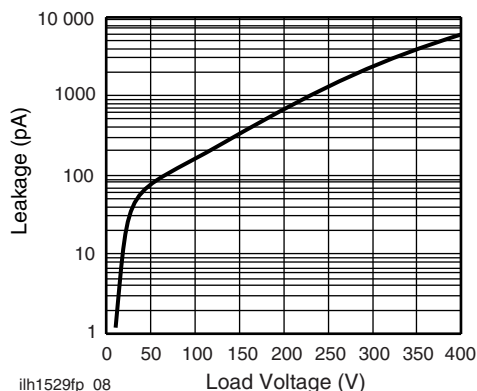


Fig. 8 - Leakage Current vs. Applied Voltage

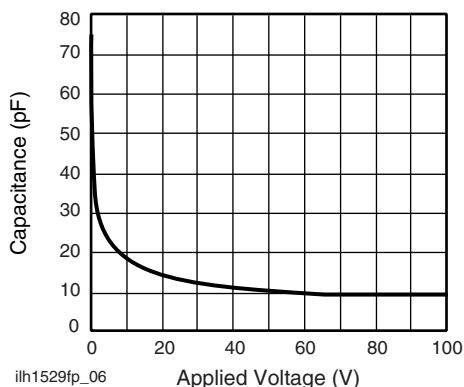


Fig. 6 - Switch Capacitance vs. Applied Voltage

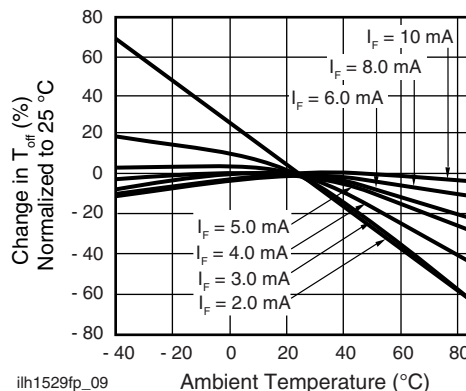


Fig. 9 - Turn-off Time vs. Temperature

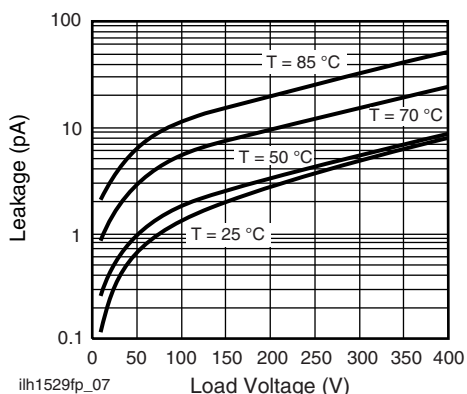


Fig. 7 - Leakage Current vs. Applied Voltage

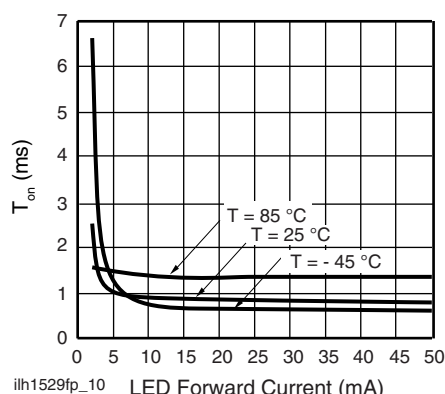
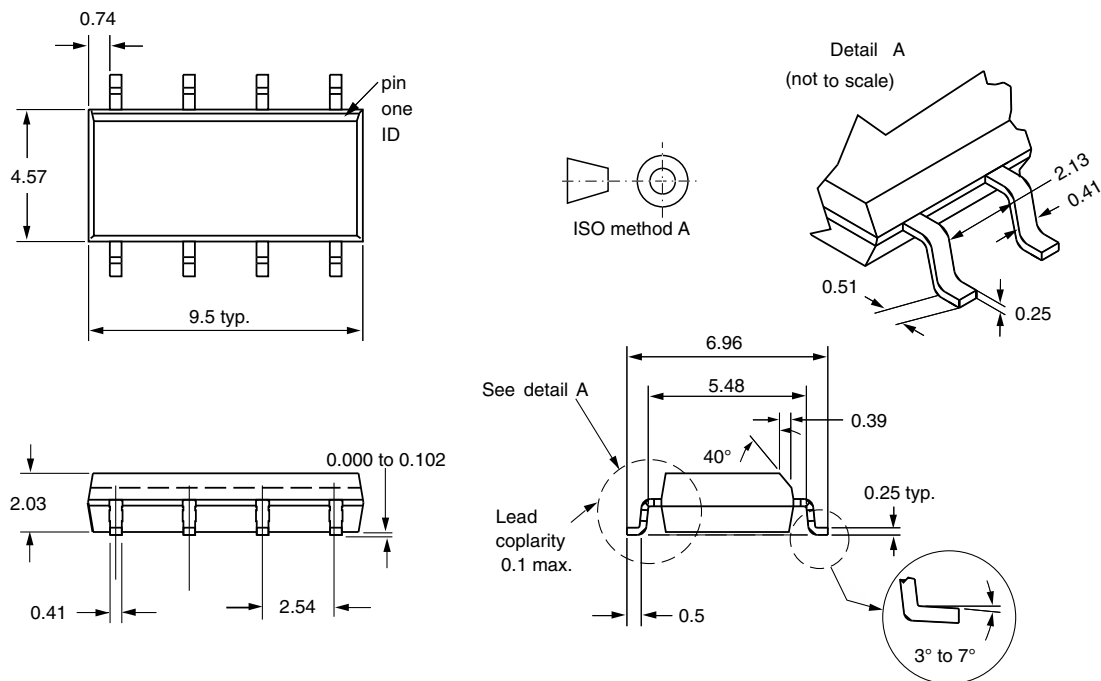


Fig. 10 - Turn-on Time vs. LED Current

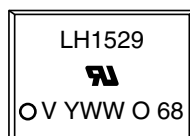


## PACKAGE DIMENSIONS in millimeters



i178024

## PACKAGE MARKING (example)



### Note

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



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