1 Form A Photo Darlington Telecomswitch

Features

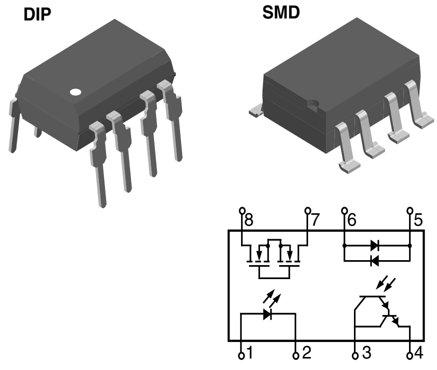
- Solid State Relay and Autopolarity Optocoupler in One 8-pin Package
- Isolation Test Voltage, 5300 V_{RMS}
- Surface Mountable
- Optocoupler
  - Bidirectional Current Detection
  - High CTR: ≥ 300 %
- Solid State Relay
  - Form A . LH1525 Type
  - Low Operating Current
  - Typical R_{ON}: 25 Ω
  - Load Voltage: 400 V
  - Load Current: 120 mA
  - Current-limit Protection
  - Linear, ac/dc Operation
  - Clean, Bounce-free Switching
  - Low Power Consumption

Agency Approvals

- UL - File No. E52744
- CSA - Certification 093751
- BSI/BABT Cert. No. 7980

Applications

General Telecom Switching
- On/off-hook Switching
- Dial Pulse
- Ring Current Detection
- Loop Current Sensing



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Description

The LH1539 telecom switch consists of an optically isolated solid state relay (SSR) Form A and a bidirectional input optocoupler in a single 8-pin package. The SSR is ideal for switch hook and dial-pulse switching while the optocoupler performs ring detect and loop current sensing functions. Both the SSR and optocoupler provide 5300 V_{RMS} of input-to-output isolation voltage.

The SSR is integrated on a monolithic receptor die using smart power 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. Very high current transfer ratio (CTR) is achieved by coupling to a photodarlington transistor. This high CTR allows the user to minimize the size of the ring detector capacitor.

Order Information

Part	Remarks
LH1539AAC	Gullwing, Tubes, SMD-8
LH1539AACTR	Gullwing, Tape and Reel, SMD-8
LH1539AB	Tubes, DIP-8

Absolute Maximum Ratings, T_{amb} = 25 °C

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.

SSR

Parameter	Test condition	Symbol	Value	Unit
LED continuous forward current		I_F	50	mA
LED reverse voltage	$I_R \leq 10\ \mu A$	V_R	8.0	V
DC or peak AC load voltage	$I_L \leq 50\ \mu A$	V_L	400	V
Continuous DC load current		I_L	120	mA
Ambient operating temperature range		T_A	- 40 to + 85	°C
Storage temperature range		T_{stg}	- 40 to + 85	°C
Pin soldering temperature	t = 10 s max	T_{sld}	260	°C
Input/output isolation voltage	t = 60 s min	V_{ISO}	5300	V_{RMS}
Package power dissipation		P_{diss}	600	mW

Optocoupler

Parameter	Test condition	Symbol	Value	Unit
LED continuous forward current		I_F	50	mA
LED reverse voltage	$I_R \leq 10\ \mu A$	V_R	3.0	V
Collector-emitter breakdown voltage		BV_{CEO}	30	V
Phototransistor power dissipation		P_{diss}	150	mW

Electrical Characteristics, T_{amb} = 25 °C

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.

SSR

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
LED forward current for switch turn-on	I_L = 100 mA, t = 10 ms	I_{Fon}		0.5	1.0	mA
LED forward current for switch turn-off	$V_L = \pm$ 300 V	I_{Foff}	0.1	0.4		mA
LED forward voltage	I_F = 3.0 mA	V_F	0.8	1.2	1.4	V
ON-Resistance	I_F = 3.0 mA, $I_L = \pm$ 50 mA	R_{ON}	17	25	33	Ω
OFF-Resistance	I_F = 0 mA, $V_L = \pm$ 100 V	R_{OFF}		5000		GΩ
Current limit	I_F = 5.0 mA, t = 5.0 ms	I_{LMT}	170	210	270	mA
Output off-state leakage current	I_F = 0 mA, $V_L = \pm$ 100 V	I_O		0.04	100	nA
Output capacitance pin 4 to pin 6	I_F = 0 mA, V_L = 1.0 V	C_O		55		pF
	I_F = 0 mA, V_L = 50 V	C_O		10		pF
Turn-on time	I_F = 5.0 mA, I_L = 50 mA	t_{on}			2.0	ms
Turn-off time	I_F = 5.0 mA, I_L = 50 mA	t_{off}			0.5	ms

Optocoupler

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
LED forward voltage	I_F = 10 mA	V_F	0.9	1.2	1.5	V
DC Current Transfer Ratio	I_F = 0.05 mA, V_{CE} = 0.9 V	CTR_{DC}	300			%
Saturation voltage	I_F = 0.05 mA, I_C = 0.15 mA	V_{CEsat}			1.0	V
Collector-emitter leakage current	I_F = 0 mA, V_{CE} = 5.0 V	I_{CEO}			N/A	

Recommended Operating Conditions

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
LED forward current for switch turn-on	T_A = - 40 °C to + 85 °C	I_{Fon}	3.0		20	mA

Typical Characteristics (T_{amb} = 25 °C unless otherwise specified)

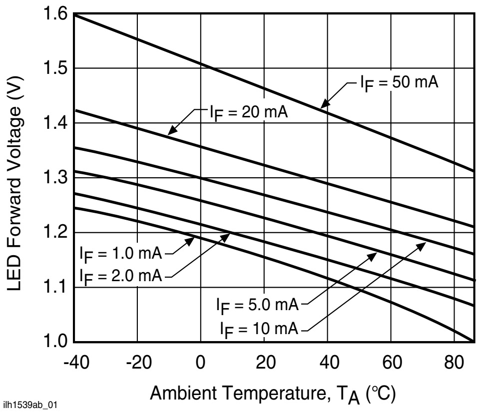


Fig. 1 LED Voltage vs. Temperature

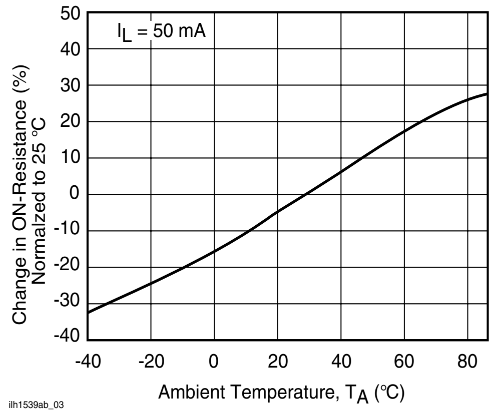


Fig. 3 ON-Resistance vs. Temperature

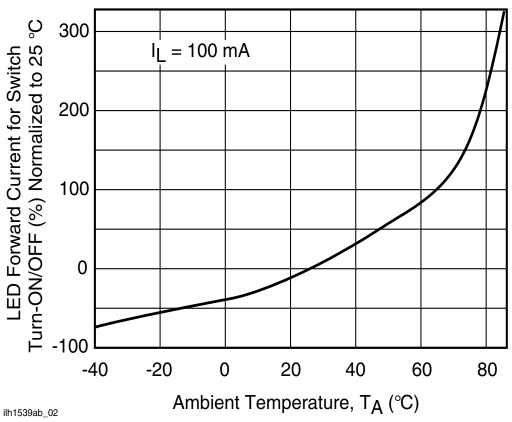


Fig. 2 LED Current for Switch Turn-on/off vs. Temperature

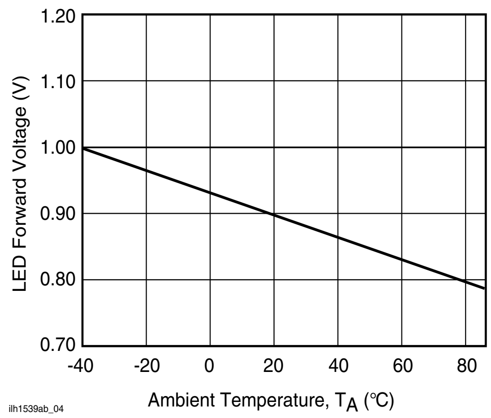


Fig. 4 LED Dropout Voltage vs. Temperature

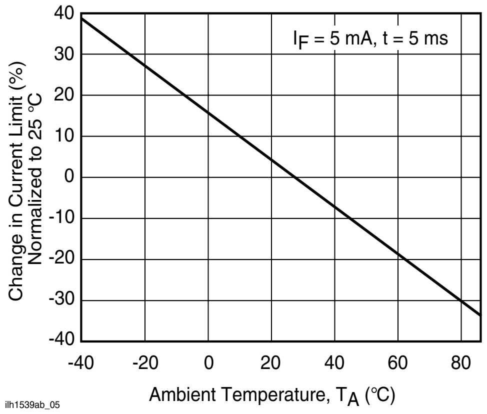


Fig. 5 Current Limit vs. Temperature

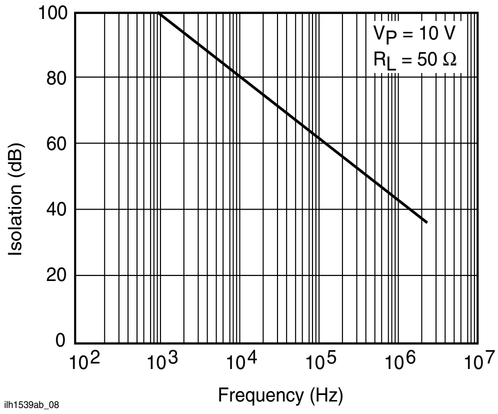


Fig. 8 Output Isolation

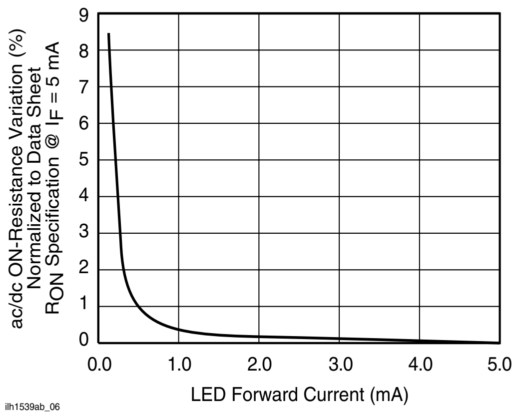


Fig. 6 Variation in ON-Resistance vs. LED Current

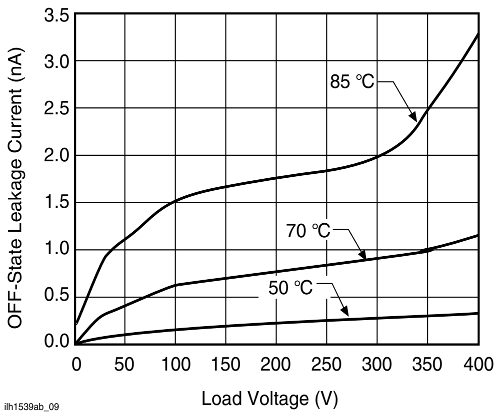


Fig. 9 Leakage Current vs. Applied Voltage at Elevated Temperatures

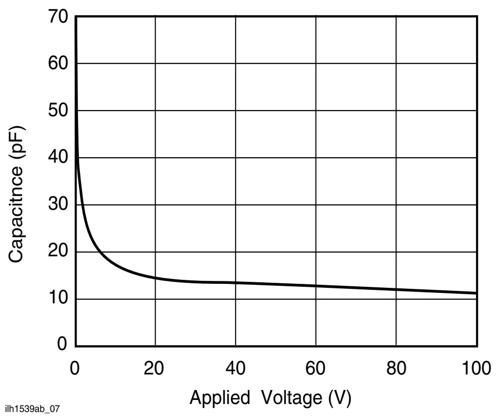


Fig. 7 Output Isolation

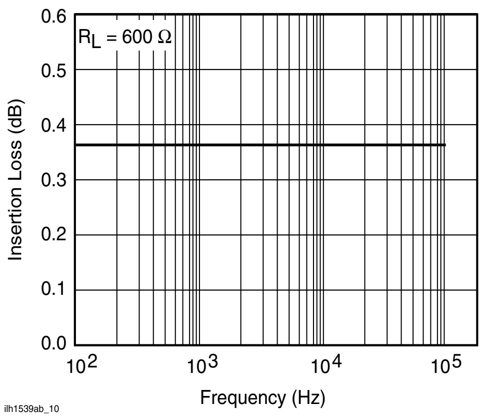


Fig. 10 Insertion Loss vs. Frequency

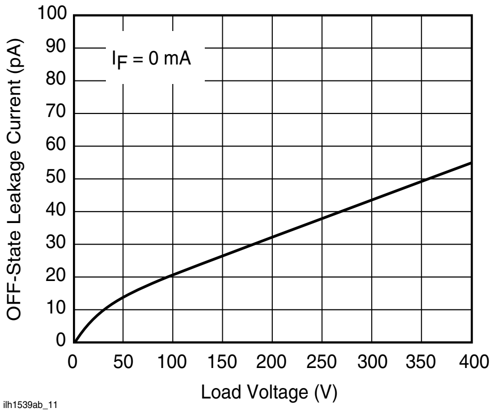


Fig. 11 Leakage Current vs. Applied Voltage

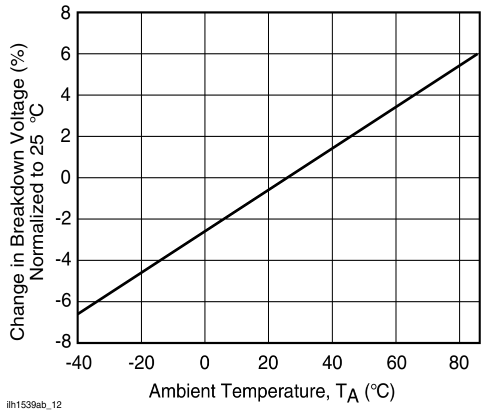
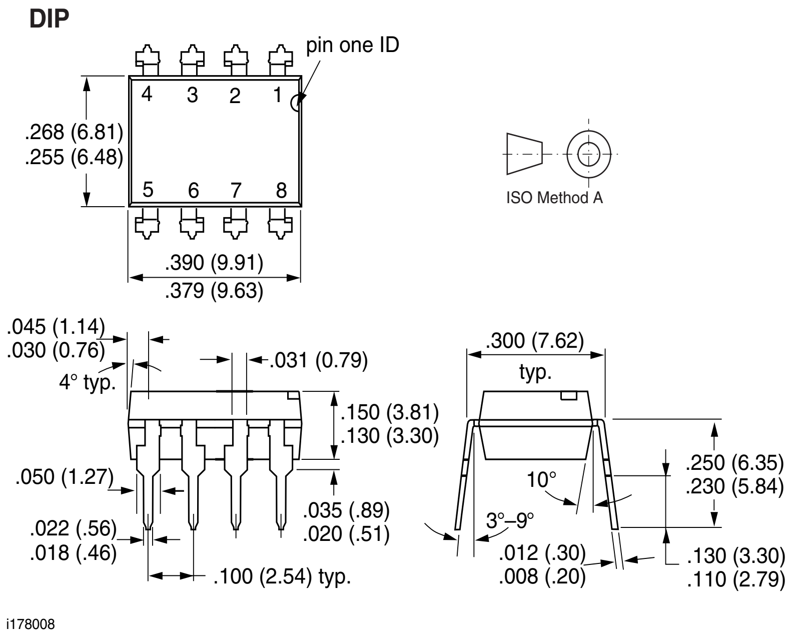
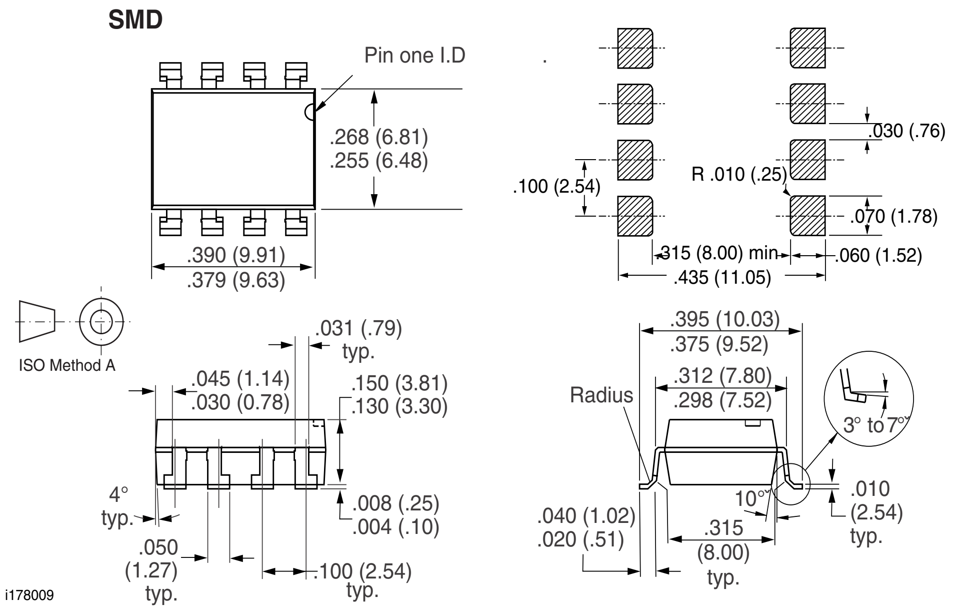


Fig. 12 Switch Breakdown Voltage vs. Temperature

Package Dimensions in Inches (mm)



Package Dimensions in Inches (mm)



Ozone Depleting Substances Policy Statement

It is the policy of **Vishay Semiconductor GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operatingsystems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

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