

## OLI149: Radiation Tolerant, Phototransistor Optocoupler

### Applications

- Aerospace
- Defense
- Industrial
- Commercial

### Features

- High voltage electrical isolation
- High Current Transfer Ratio (CTR) assured over  $-55^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$
- Collector-emitter breakdown voltage:  $>60\text{ V}$
- Radiation tolerant
- Small surface mount size
- For RoHS and other product compliance information, see [Skyworks Certificate of Conformance](#).

### Description

The OLI149 is designed especially for high-reliability applications that require optical isolation in radiation environments such as gamma, neutron, and proton radiation with high CTR and low saturation  $V_{CE}$ .

Each optocoupler consists of an LED and NPN silicon phototransistor that are electrically isolated, but optically coupled on a ceramic Leadless Chip Carrier (LCC) surface mount package.

The epoxy coating on the OLI149 allows the device to withstand normal solvent cleaning operations. Surface mounting can be accomplished with either conductive epoxies or by reflow soldering.

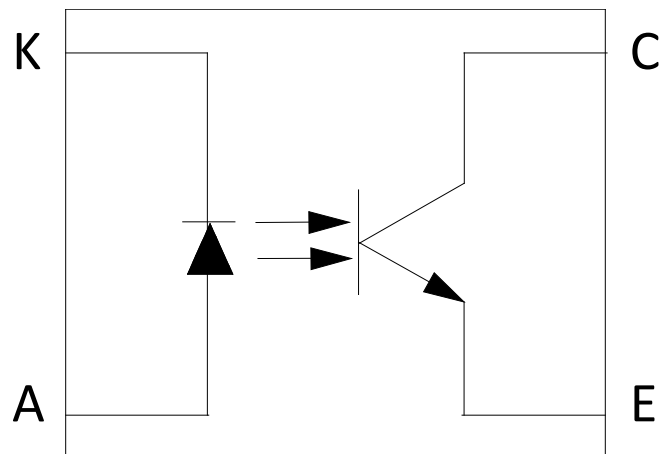


Figure 1. Functional Block Diagram

## Non-Hermetic 4-Lead Glob Top

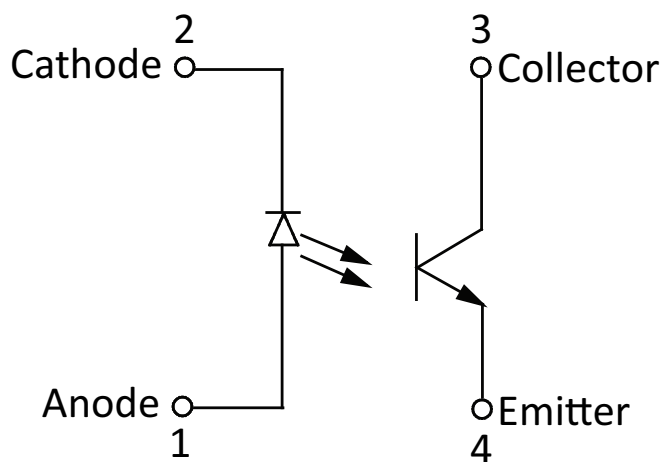


Figure 2. Pinout

## Electrical and Mechanical Specifications

**Table 1. Absolute Maximum Ratings<sup>1</sup>**  
( $T_A = +25\text{ }^{\circ}\text{C}$ , Unless Otherwise Noted)

Parameter	Symbol	Conditions	Min	Max	Units
<b>Input</b>					
Average forward current	$I_{DD}$			40	mA
Peak forward current	$I_F$	Duration $\leq 1\text{ ms}$		60	mA
Reverse voltage	$V_R$			3	V
Input power dissipation	$P_D$			70	mW
<b>Output</b>					
Collector to emitter voltage	$V_{CEO}$			60	V
Emitter to collector voltage	$V_{ECO}$			5	V
Output power dissipation	$P_D$			200	mW
Output power dissipation derating	$\Delta P_D / \Delta T_A$	$T_A \geq 25\text{ }^{\circ}\text{C}$		2.0	mW/ $^{\circ}\text{C}$
<b>Coupler</b>					
Input to output isolation voltage <sup>2</sup>	$V_{DC}$		-1500	1500	V
Storage temperature range	$T_{STG}$		-65	150	$^{\circ}\text{C}$
Operating temperature range	$T_A$		-55	125	$^{\circ}\text{C}$
Soldering temperature	$T_{SLD}$	20 seconds		240	$^{\circ}\text{C}$
<b>Electrostatic Discharge</b>					
MIL-STD-883, Method 3015 Human Body Model (HBM)	ESD	Class 1C rating		2000	V

1. Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to the device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.
2. Measured between pins 1 and 2 shorted together, and pins 3 and 4 shorted together.  $T_A = 25\text{ }^{\circ}\text{C}$  and duration = 1 s.

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**ESD Handling:** Industry-standard ESD handling precautions must be adhered to at all times to avoid damage to this device.

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**Table 2. Electrical Specifications<sup>1</sup>**  
( $T_A = +25\text{ }^{\circ}\text{C}$ , Unless Otherwise Noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Input						
Forward voltage	V <sub>F</sub>	I <sub>F</sub> = 10.0 mA, 25 °C	1.3		1.8	V
		I <sub>F</sub> = 10.0 mA, 100 °C	1.2		1.6	
		I <sub>F</sub> = 10.0 mA, −55 °C	1.6		2.2	
Reverse current	I <sub>R</sub>	V <sub>R</sub> = 3 V			100	μA
Output						
Collector emitter breakdown voltage	BV <sub>CEO</sub>	I <sub>CE</sub> = 1 mA	60			V
Emitter collector breakdown voltage	BV <sub>ECO</sub>	I <sub>EC</sub> = 100 μA	5			V
Collector emitter dark current	I <sub>CE_OFF</sub>	I <sub>F</sub> = 0 mA, V <sub>CE</sub> = 20 V			100	nA
		I <sub>F</sub> = 0 mA, V <sub>CE</sub> = 20 V, 100 °C		10		μA
		I <sub>F</sub> = 0 mA, V <sub>CE</sub> = 20 V, 125 °C			100	μA
Coupler						
Current transfer ratio (I <sub>C</sub> /I <sub>F</sub> )	CTR	I <sub>F</sub> = 1 mA, V <sub>CE</sub> = 5 V	200		1200	%
		I <sub>F</sub> = 2 mA, V <sub>CE</sub> = 5 V, 100 °C	200			
		I <sub>F</sub> = 2 mA, V <sub>CE</sub> = 5 V, −55 °C	280			
Collector emitter saturation voltage	V <sub>CE_SAT</sub>	I <sub>F</sub> = 2 mA, I <sub>C</sub> = 2 mA			0.3	V
Input-output resistance <sup>2</sup>	R <sub>I-O</sub>	V <sub>I-O</sub> = ±1000 V <sub>DC</sub>		10 <sup>11</sup>		Ω
Switching Characteristics						
Rise time	t <sub>r</sub>	V <sub>CC</sub> = 10 V, I <sub>F</sub> = 2 mA, R <sub>L</sub> = 100 Ω			25	μs
Fall time	t <sub>f</sub>				25	μs

1. Performance is assured only under the conditions listed in the above table.

Catalog OLI149 is 100% tested at  $25\text{ }^{\circ}\text{C}$  only and specifications over temperature are assured by design or initial characterization.

2. Measured between pins 1 and 2 shorted together, and pins 3 and 4 shorted together.  $T_A = 25\text{ }^{\circ}\text{C}$  and duration = 1 second.

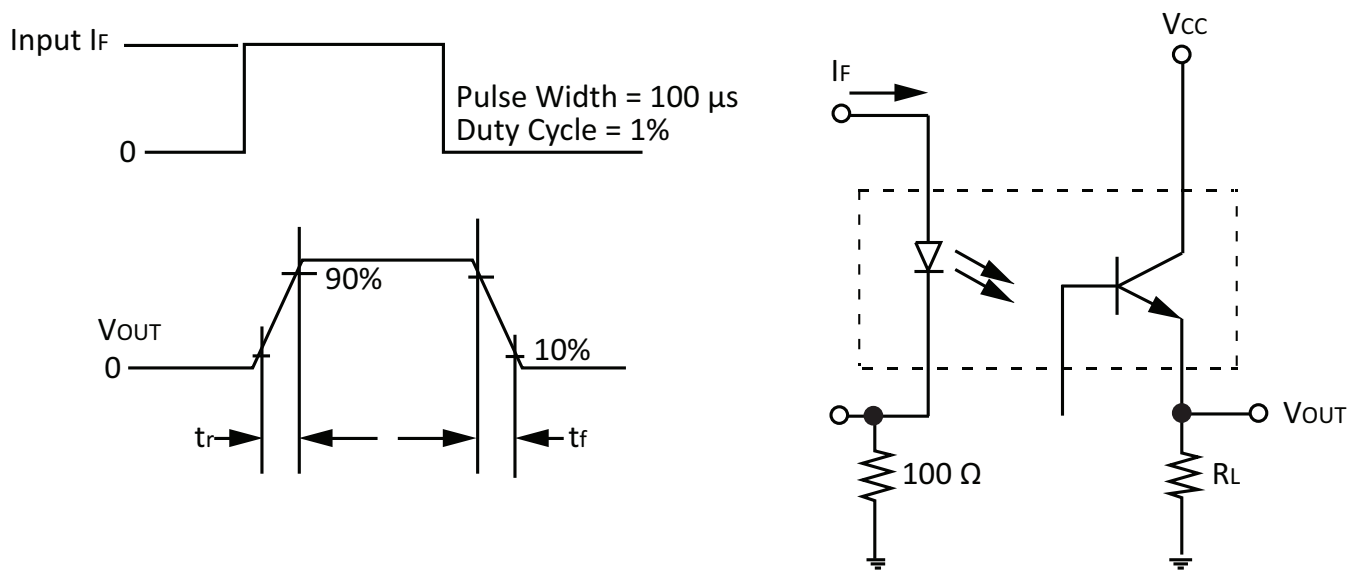


Figure 3. Switching Test Circuit

### Typical Performance Characteristics ( $T_A = 25^\circ\text{C}$ , Unless Otherwise Indicated)

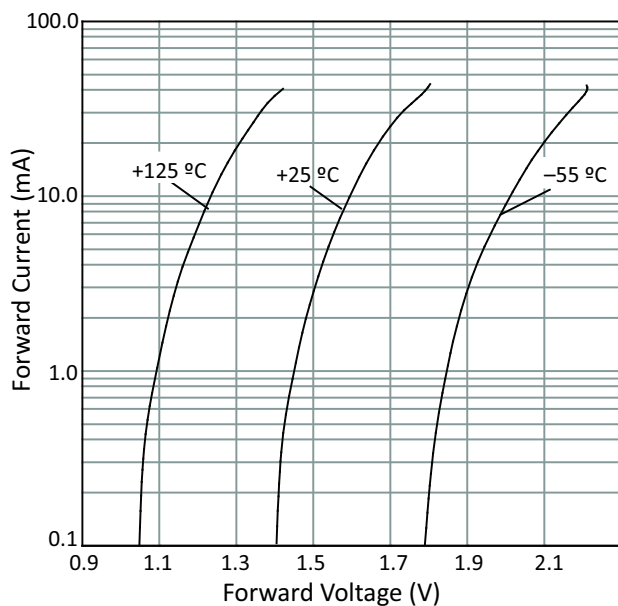


Figure 4. Forward Current vs Forward Voltage

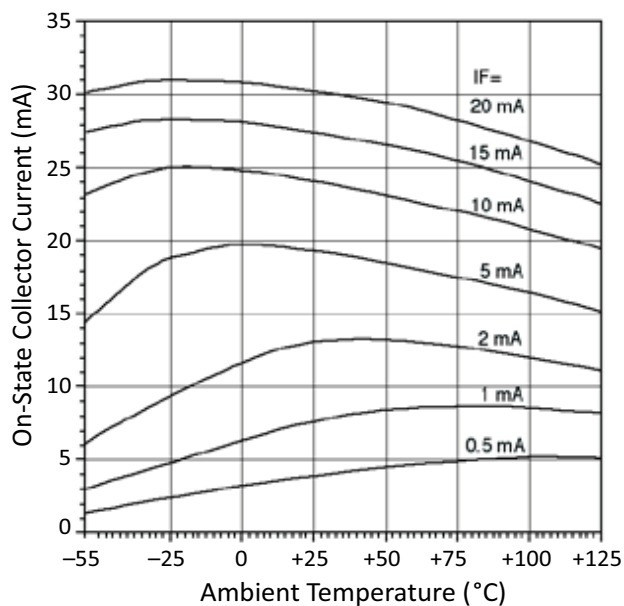
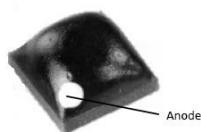


Figure 5. On-State Collector Current vs Temperature

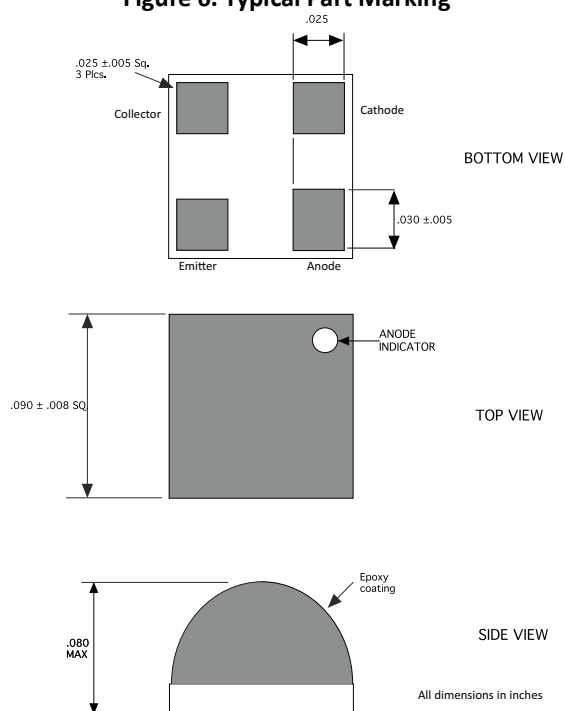
## Package and Handling Information

Since the device is sensitive to moisture absorption, it is baked and vacuum packed before shipping. Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

The OLI149 is rated to Moisture Sensitivity Level 3 (MSL3) at 260 °C. Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment.



**Figure 6. Typical Part Marking**



**Figure 7. Package Dimensions**

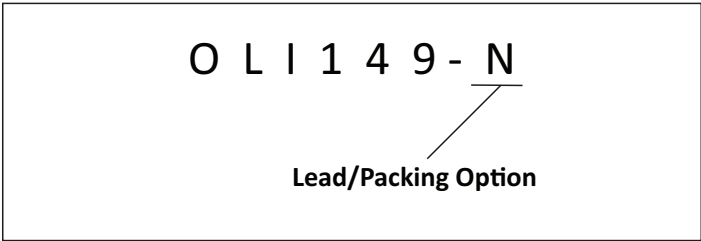
**Table 3. Additional Package Information**

	4-lead Glob Top (OLI149YYY-N)
Lead finish/plating	Min 60 µin Au over min 80 µin Ni
Lead thickness	N/A
Hermetic	No
Max package weight	0.030 grams
	CAGE code OJGG3

Table 4. Related Parts

Part Number	Package	Description	Comments
OLI100	6-lead glob top for hybrid assembly	Miniature phototransistor optocoupler for hybrid assembly	Min 100% CTR assured over -55 °C to 125 °C, 1500 V <sub>DC</sub> isolation voltage
OLI110	4-lead glob top	Small surface mount phototransistor optocoupler	1500 V <sub>DC</sub> isolation voltage, BV <sub>CEO</sub> >60 V

Ordering Information



	Non-Hermetic 4-Lead Glob Top SMT
<b>Screen Level</b>	
Catalog	OLI149
<b>Lead Finish and Packing Options (-N)</b>	
Non-solder dipped and standard packing	Blank
Solder dipped	-1
Tape and reel	N/A
Solder dip and tape and reel	N/A
Standard packing	Waffle tray

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