

DATA SHEET

# OLI249: Radiation-Tolerant, Phototransistor Optocoupler for Hybrid Assembly

## Features

- Current transfer ratio (CTR) is:
  - Guaranteed over -55 °C to +100 °C ambient temperature range
  - High at low input current: 200% at  $I_F = 2 \text{ mA}$  over temperature
  - Comparable to Darlington output, but with low saturation  $V_{CE} = 0.15 \text{ V}$  typical
- 1500 Vdc electrical isolation
- Small footprint for hybrid device
- More radiation tolerant than 4N49 (contact Isolink for more information)
- Similar to 4N4X type optocouplers
- High reliability and rugged construction
- Custom package is available (contact Isolink for more information)

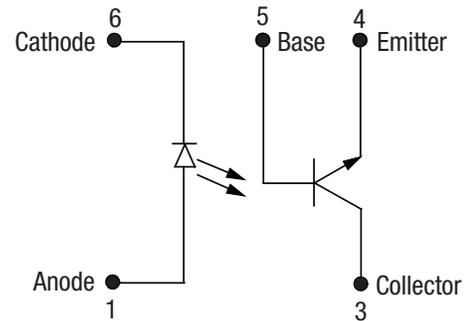
## Description

The OLI249 is designed especially for hybrid applications that require optical isolation with high CTR and low saturation  $V_{CE}$ . Each OLI249 consists of an LED and N-P-N silicon phototransistor that is mounted and coupled in a miniature custom ceramic package. The low input current makes the OLI249 well suited for direct Complementary Metal Oxide Semiconductor (CMOS) to Low Power Schottky Transistor-Transistor Logic (LSTTL)/ Transistor-to-Transistor Logic (TTL) interfaces.

Electrical parameters are similar to the JEDEC registered 4N49 optocoupler, but with better CTR degradation characteristics due to radiation exposure.

Device mounting is achieved by standard hybrid assembly with non-conductive epoxies. Gold or aluminum wire bonding can be used to make electrical connections for maximum placement flexibility.

Special electrical parametric selections are available upon request.



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Figure 1. OLI249 Block Diagram

Figure 1 shows the OLI249 functional block diagram. Table 1 provides the OLI249 absolute maximum ratings. Table 2 provides the OLI249 electrical specifications.

Figures 2 through 4 illustrate the OLI249 typical performance characteristics. Figure 5 shows the OLI249 switching test circuit. Figure 6 provides the OLI249 package dimensions.

**Table 1. OLI249 Absolute Maximum Ratings<sup>1</sup>**

Parameter	Symbol	Minimum	Maximum	Units
<b><i>Coupled</i></b>				
Input to output isolation voltage <sup>2</sup>	V <sub>DC</sub>	-1500	+1500	V
Storage temperature range	T <sub>STG</sub>	-65	+150	°C
Operating temperature range	T <sub>A</sub>	-55	+125	°C
Mounting temperature range (3 minutes maximum)	T <sub>MTG</sub>		240	°C
<b><i>Input Diode</i></b>				
Average input current	I <sub>DD</sub>		40	mA
Peak forward current (≤1 ms duration)	I <sub>F</sub>		60	mA
Reverse voltage	V <sub>R</sub>		3	V
Power dissipation	P <sub>D</sub>		70	mW
<b><i>Output Detector</i></b>				
Collector to emitter voltage	V <sub>CE</sub>		40	V
Emitter to collector voltage	V <sub>EC</sub>		7	V
Collector to base voltage	V <sub>CB</sub>		45	V
Power dissipation <sup>3</sup>	P <sub>D</sub>		200	mW

<sup>1</sup> 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 in the above table may result in permanent damage to the device.

<sup>2</sup> Measured between pins 1 and 6 shorted together, and pins 2, 3, 4, and 5 shorted together. T<sub>A</sub> = 25 °C and duration = 1 s.

<sup>3</sup> Value applies for P<sub>w</sub> ≤1 ms, PRR ≤300 pps.

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**ESD HANDLING:** *Although this device is designed to be as robust as possible, electrostatic discharge (ESD) can damage this device. This device must be protected at all times from ESD when handling or transporting. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD handling precautions should be used at all times.*

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**Table 2. OLI249 Electrical Specifications<sup>1</sup>**  
**(T<sub>A</sub> = 25 °C, Unless Otherwise Noted)**

Parameter	Symbol	Test Condition	Minimum	Maximum	Units
On-state:					
Collector current	I <sub>CC(ON)</sub>	I <sub>F</sub> = 1.0 mA, V <sub>CE</sub> = 5.0 V	2.0	12.0	mA
		I <sub>F</sub> = +2.0 mA, V <sub>CE</sub> = +5.0 V, T <sub>A</sub> = -55 °C	2.8		mA
		I <sub>F</sub> = 2 mA, V <sub>CE</sub> = 5 V, T <sub>A</sub> = 100 °C	2		mA
Collector base current	I <sub>CCB(ON)</sub>	I <sub>F</sub> = 10 mA, V <sub>CB</sub> = 5 V	30		μA
Saturation voltage	V <sub>CE_SAT</sub>	I <sub>F</sub> = 2.0 mA, I <sub>C</sub> = 2.0 mA		0.3	V
Breakdown voltage:					
Collector to emitter	BV <sub>CEO</sub>	I <sub>CE</sub> = 1 mA	40		V
Collector to base	BV <sub>CBO</sub>	I <sub>CB</sub> = 100 μA	45		V
Emitter to base	BV <sub>EBO</sub>	I <sub>EB</sub> = 100 μA	7		V
Off-state leakage current:					
Collector to emitter	I <sub>CE(OFF)</sub>	V <sub>CE</sub> = 20 V		100	nA
		V <sub>CE</sub> = 20 V, T <sub>A</sub> = 100 °C		100	μA
Collector to base	I <sub>CB(OFF)</sub>	V <sub>CB</sub> = 20 V		10	nA
Input:					
Forward voltage	V <sub>F</sub>	I <sub>F</sub> = +10.0 mA, T <sub>A</sub> = -55 °C	1.4	2.0	V
		I <sub>F</sub> = 10.0 mA	1.2	1.8	V
		I <sub>F</sub> = 10.0 mA, T <sub>A</sub> = 100 °C	1.1	1.7	V
Reverse current	I <sub>R</sub>	V <sub>R</sub> = 2 V		100	μA
Output resistance <sup>2</sup>	R <sub>L_0</sub>	V <sub>L_0</sub> = ±1000 V <sub>DC</sub>	10 <sup>11</sup>		Ω
Output capacitance <sup>2</sup>	C <sub>L_0</sub>	V <sub>L_0</sub> = 0 V, f = 1 MHz		5	pF
Time:					
Rise	t <sub>r</sub>	V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω		25	μs
Fall	t <sub>f</sub>	I <sub>C</sub> = 5 mA		25	μs

<sup>1</sup> Performance is guaranteed only under the conditions listed in the above table.

<sup>2</sup> Measured between pins 1 and 6 shorted together, and pins 2, 3, 4, and 5 shorted together. T<sub>A</sub> = 25 °C and duration = 1 s.

## Typical Performance Characteristics

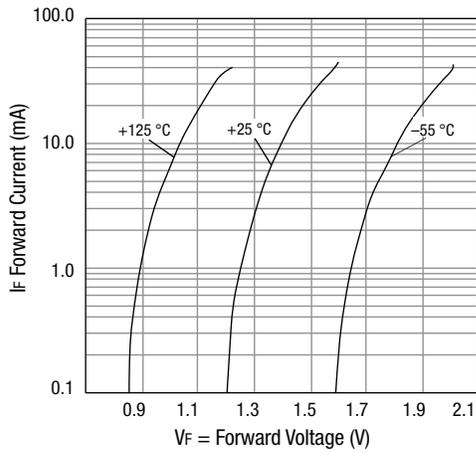


Figure 2. Forward Current vs Diode Forward Voltage

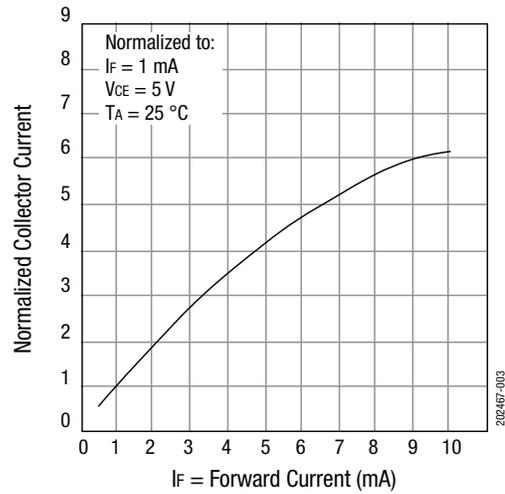


Figure 3. Normalized Collector Current vs Forward Current

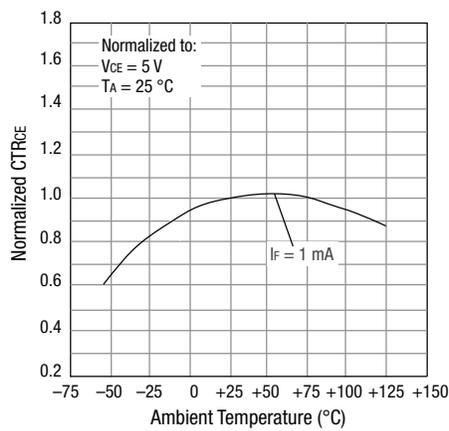
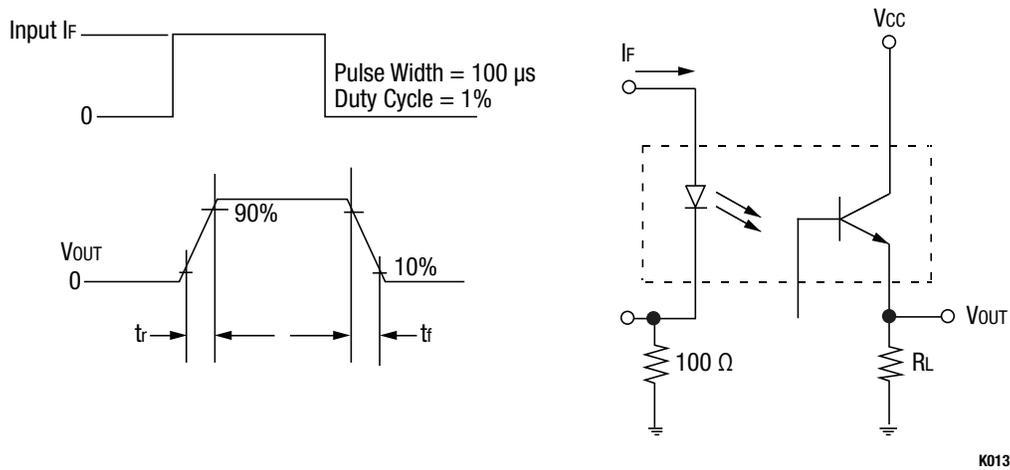


Figure 4. Normalized CTR<sub>CE</sub> vs Temperature



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Figure 5. OLI249 Switching Test Circuit

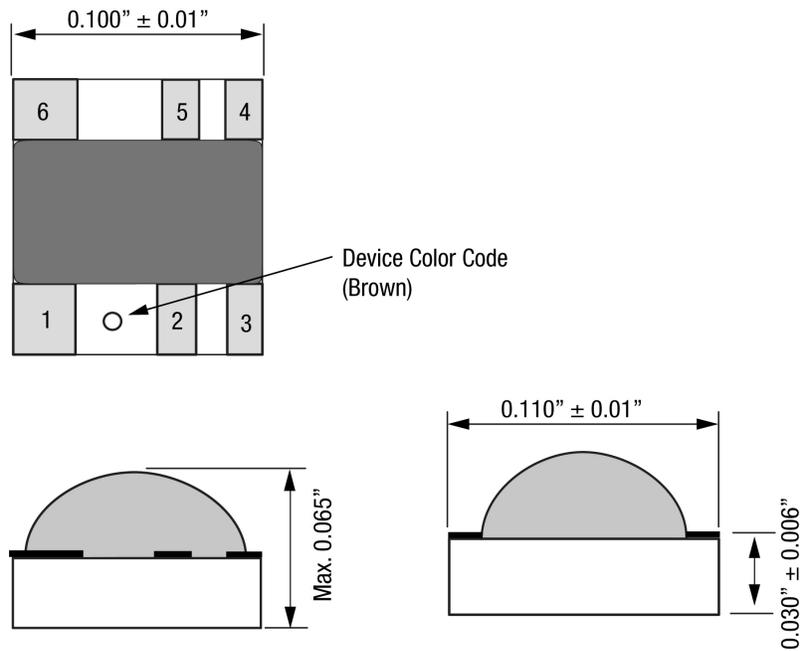


Figure 6. OLI249 Package Dimensions

## Ordering Information

Part Number	Product Description
OLI249	Radiation-Tolerant, Phototransistor Optocoupler for Hybrid Assembly

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