

DATA SHEET

# OLS249: Radiation-Tolerant Phototransistor Hermetic Surface-Mount Optocoupler

## Features

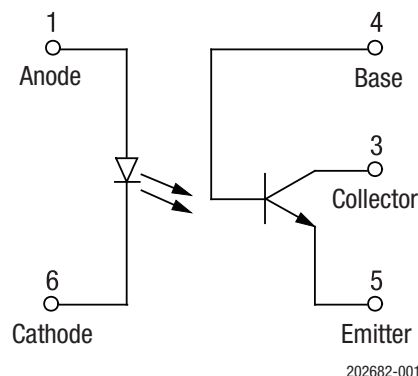
- Hermetic SMT package
- 1500 V<sub>DC</sub> electrical isolation
- High CTR
- Small package size
- High reliability and rugged construction
- High-reliability screening available
- Radiation tolerant

## Description

The OLS249 consists of an LED that is optically coupled to an N-P-N silicon phototransistor, which is mounted and coupled in a custom hermetic surface-mount technology (SMT) leadless chip carrier (LCC) package.

The low input current makes the OLS249 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 current transfer ratio (CTR) degradation characteristics due to radiation exposure. Special electrical parametric selections are available upon request.



**Figure 1. OLS249 Block Diagram**

Figure 1 shows the OLS249 functional block diagram. Table 1 provides the OLS249 absolute maximum ratings. Table 2 provides the OLS249 electrical specifications.

Figures 2 through 4 illustrate the OLS249 typical performance characteristics. Figure 5 shows the OLS249 switching test circuit. Figure 6 provides the OLS249 package dimensions.

**Table 1. OLS249 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 (10 seconds maximum)	T <sub>MTG</sub>		+240	°C
<b><i>Input Diode</i></b>				
Average input current <sup>3</sup>	I <sub>DD</sub>		40	mA
Peak forward current <sup>4</sup>	I <sub>F</sub>		1	A
Reverse voltage	V <sub>R</sub>		2	V
<b><i>Output Detector</i></b>				
Collector to emitter voltage	V <sub>CE</sub>		40	V
Emitter to base voltage	V <sub>EB</sub>		7	V
Collector to base voltage	V <sub>CB</sub>		45	V
Continuous collector current	I <sub>CC</sub>		50	mA
Power dissipation <sup>5</sup>	P <sub>D</sub>		300	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 here may result in permanent damage to the device.

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

<sup>3</sup> Derate linearly to 125 °C free-air temperature at 0.67 mA/°C above 65 °C.

<sup>4</sup> For pulse width ≤ 1 μs, pulse repetition rate ≤ 300 pps.

<sup>5</sup> Derate linearly to 125 °C free-air temperature at 3.0 mW/°C above 25 °C.

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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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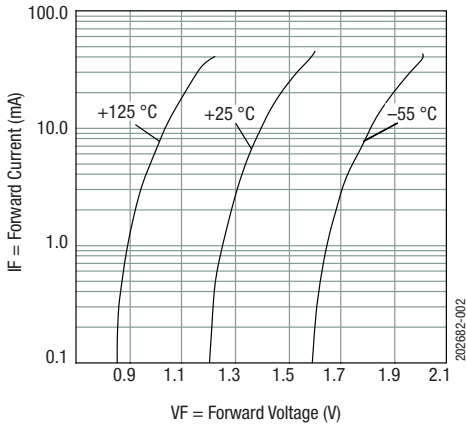
**Table 2. OLS249 Electrical Specifications<sup>1</sup>**  
**(T<sub>A</sub> = 25 °C, Unless Otherwise Noted)**

Parameter	Symbol	Test Condition	Minimum	Maximum	Units
On-state:					
Collector current	I <sub>C_ON</sub>	I <sub>F</sub> = 1 mA, V <sub>CE</sub> = 5 V I <sub>F</sub> = +2 mA, V <sub>CE</sub> = +5 V, T <sub>A</sub> = -55 °C I <sub>F</sub> = 2 mA, V <sub>CE</sub> = 5 V, T <sub>A</sub> = 125 °C	2.0 +2.8 2.0	12.0	mA mA mA
Collector base current	I <sub>CB_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 mA, I <sub>C</sub> = 2 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		
Emitter to base	BV <sub>EBO</sub>	I <sub>EB</sub> = 100 μA	7		
Off-state leakage current:					
Collector to emitter	I <sub>CE_OFF</sub>	V <sub>CE</sub> = 20 V V <sub>CE</sub> = 20 V, T <sub>A</sub> = 125 °C		100 100	nA 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 I <sub>F</sub> = 10.0 mA I <sub>F</sub> = 10.0 mA, T <sub>A</sub> = 125 °C	+1.4 1.2 1.1	+2.0 1.8 1.7	V V V
Reverse current	I <sub>R</sub>	V <sub>R</sub> = 2 V		100	μA
Output resistance <sup>2</sup>	r <sub>i_0</sub>	V <sub>i-0</sub> = ±1000 V <sub>DC</sub>	10 <sup>11</sup>		Ω
Output capacitance <sup>2</sup>	C <sub>i_0</sub>	f = 1 MHz		5	pF
Times:					
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>F</sub> = 5 mA		25	μs

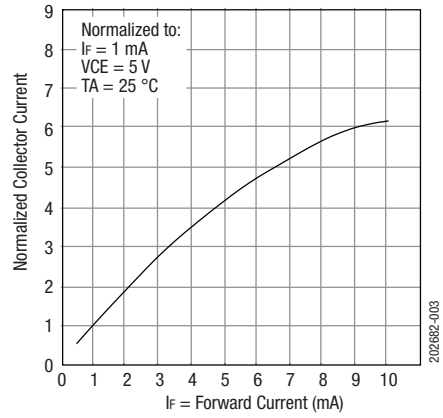
<sup>1</sup> Performance is guaranteed only under the conditions listed in the above table.

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

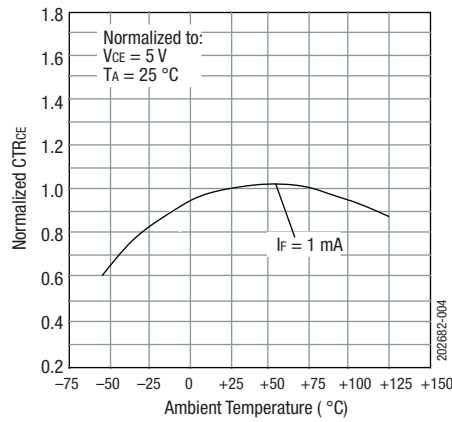
### Typical Performance Characteristics



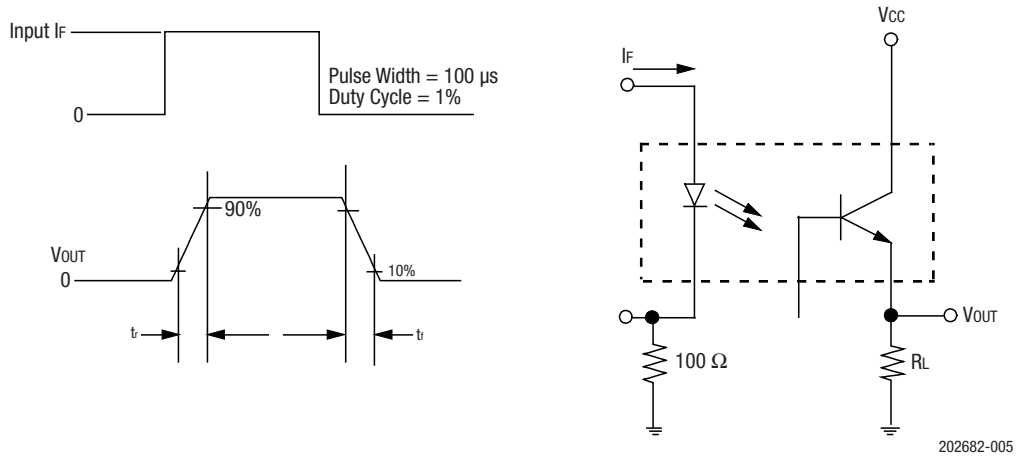
**Figure 2. Forward Current vs Diode Forward Voltage**



**Figure 3. Normalized Collector Current vs Forward Current**

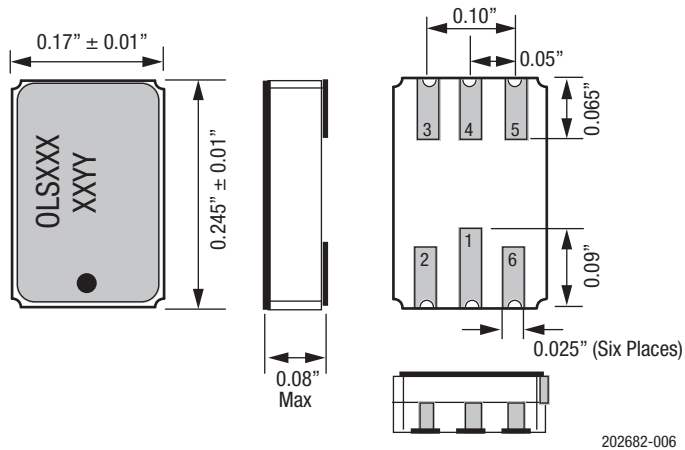


**Figure 4. Normalized CTR<sub>ce</sub> vs Temperature**



202682-005

Figure 5. OLS249 Switching Test Circuit



202682-006

Figure 6. OLS249 Package Dimensions

## Ordering Information

Model Name	Manufacturing Part Number
OLS249: Radiation-Tolerant Phototransistor Hermetic Surface-Mount Optocoupler	OLS249

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