

DATA SHEET

OLS049: Radiation-Tolerant, Phototransistor Hermetic Surface-Mount Optocoupler

Features

- Miniature hermetic surface-mount package
- Radiation tolerant
- High CTR guaranteed over $-55\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ ambient temperature range
- 1000 V_{dc} electrical isolation
- High-reliability screening is available

Description

The OLS049 is specifically designed for high reliability applications that require optical isolation in radiation environments such as gamma, neutron, and proton radiation with a high Current Transfer Ratio (CTR) and low saturation V_{CE}. Each optocoupler consists of an LED and N-P-N silicon phototransistor that is electrically isolated, but optically coupled inside a hermetic, four-pin Leadless Chip Carrier (LCC) package.

Electrical parameters are similar to the JEDEC registered 4N49U optocoupler, but with better CTR degradation characteristics due to radiation exposure. The OLS049 has 100 percent high reliability screened parts available.

The device mounting for the OLS049 is achieved with reflow soldering or conductive epoxies.

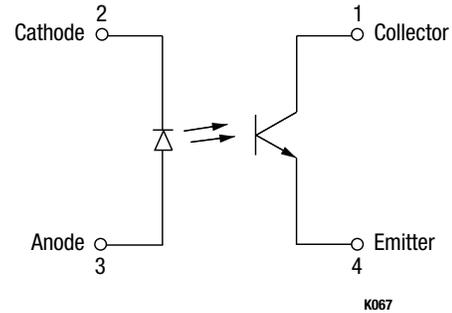


Figure 1. OLS049 Block Diagram

A functional block diagram of the OLS049 is shown in Figure 1. The absolute maximum ratings of the OLS049 are provided in Table 1. Electrical specifications are provided in Table 2.

Typical performance characteristics of the OLS049 are illustrated in Figures 2 through 4. A typical switching test circuit is shown in Figure 5 and package dimensions for the OLS049 are provided in Figure 6.

Table 1. OLS049 Absolute Maximum Ratings¹

Parameter	Symbol	Minimum	Maximum	Units
<i>Coupled</i>				
Input to output isolation voltage ²	V _{DC}	-1000	+1000	V
Storage temperature range	T _{STG}	-65	+150	°C
Operating temperature range	T _A	-55	+125	°C
Soldering temperature (heated collet, 5 seconds)			260	°C
Soldering temperature (vapor phase reflow, 30 seconds)			215	°C
<i>Input Diode</i>				
Average input current	I _{DD}		40	mA
Peak forward current (≤1 ms duration)	I _F		1	A
Reverse voltage	V _R		2	V
Power dissipation ³	P _D		60	mW
<i>Output Detector</i>				
Collector to emitter voltage	V _{CE}		60	V
Emitter to collector voltage	V _{EC}		5	V
Continuous collector current	I _{CC}		50	mA
Power dissipation ⁴	P _D		300	mW

¹ Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to 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 4 shorted together, and pins 2 and 3 shorted together. T_A = 25 °C and duration = 1 s.

³ Derate linearly at 1 mW/°C above 65 °C.

⁴ Derate linearly at 3 mW/°C above 25 °C.

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.*

Table 2. OLS049 Electrical Specifications¹
(T_A = 25 °C, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Max	Units
On-state collector current	I _{C_ON}	I _F = 1 mA, V _{CE} = 5 V I _F = 2.0 mA, V _{CE} = +5.0 V, T _A = -55 °C I _F = 2 mA, V _{CE} = 5 V, T _A = 100 °C	2 +2.8 2	12	mA
Saturation voltage	V _{CE_SAT}	I _F = 2.0 mA, I _C = 2.0 mA		0.3	V
Breakdown voltage: Collector to emitter Emitter to collector	BV _{CEO} BV _{ECO}	I _{CE} = 1 mA I _{EC} = 100 μA	60 5		V
Leakage current, collector to emitter	I _{CE_OFF}	V _{CE} = 20 V V _{CE} = 20 V, T _A = 100 °C		100 100	nA μA
Input: Forward voltage	V _F	I _F = 10.0 mA, T _A = -55 °C I _F = 10.0 mA I _F = 10.0 mA, T _A = 100 °C	+1.4 1.2 1.1	+2.0 1.8 1.7	V V V
Reverse current	I _R	V _R = 2 V		100	μA
Output resistance ²	R _{L_0}	V _{L_0} = ±1000 V _{DC}	10 ¹¹		Ω
Output capacitance ²	C _{L_0}	V _{L_0} = 0 V, f = 1 MHz		5	pF
Time: Rise Fall	t _r t _f	V _{CC} = 10 V, R _L = 100 Ω I _F = 10 mA		25 25	μs μs

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

² Measured between pins 1 and 4 shorted together, and pins 2 and 3 shorted together. T_A = 25 °C and duration = 1 s.

Typical Performance Characteristics

($T_A = -55\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$, Unless Otherwise Noted)

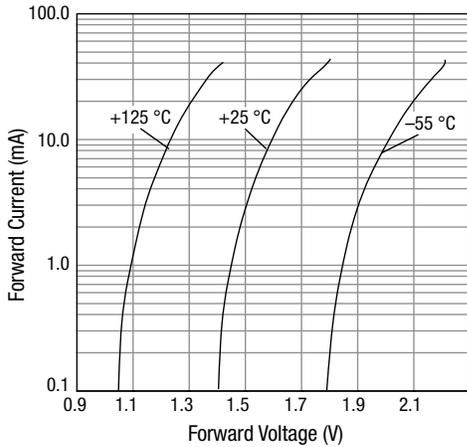


Figure 2. Forward Current vs Forward Voltage

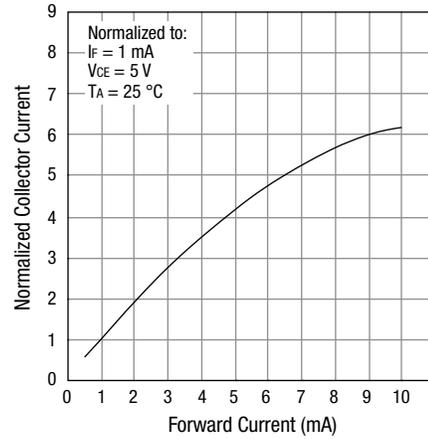


Figure 3. Normalized Collector Current vs Forward Current

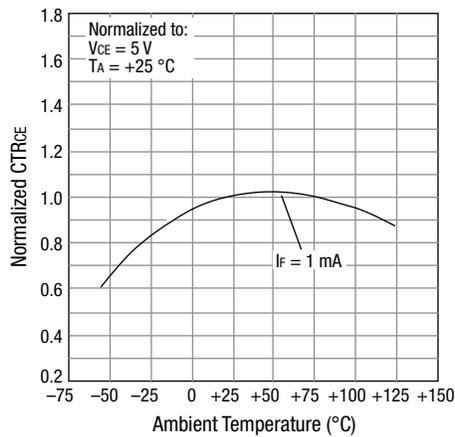


Figure 4. Normalized CTR_{ce} vs Temperature

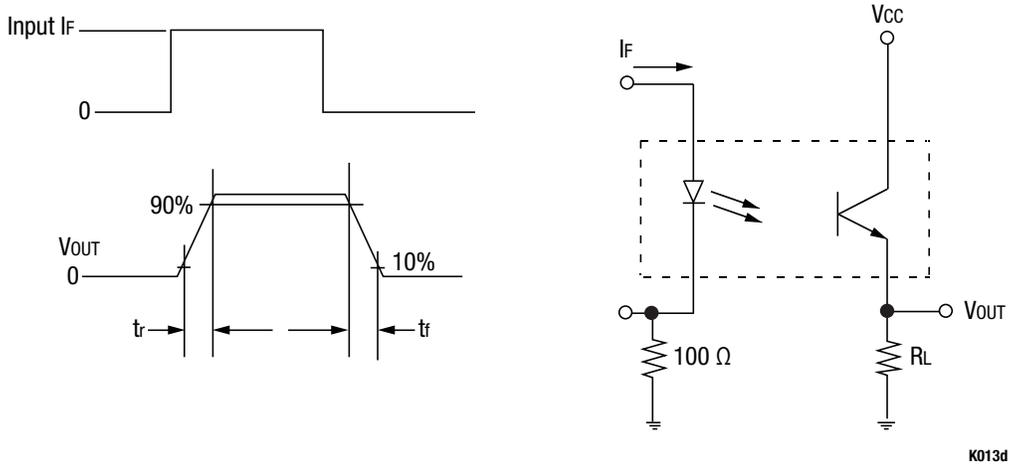


Figure 5. OLS049 Switching Test Circuit

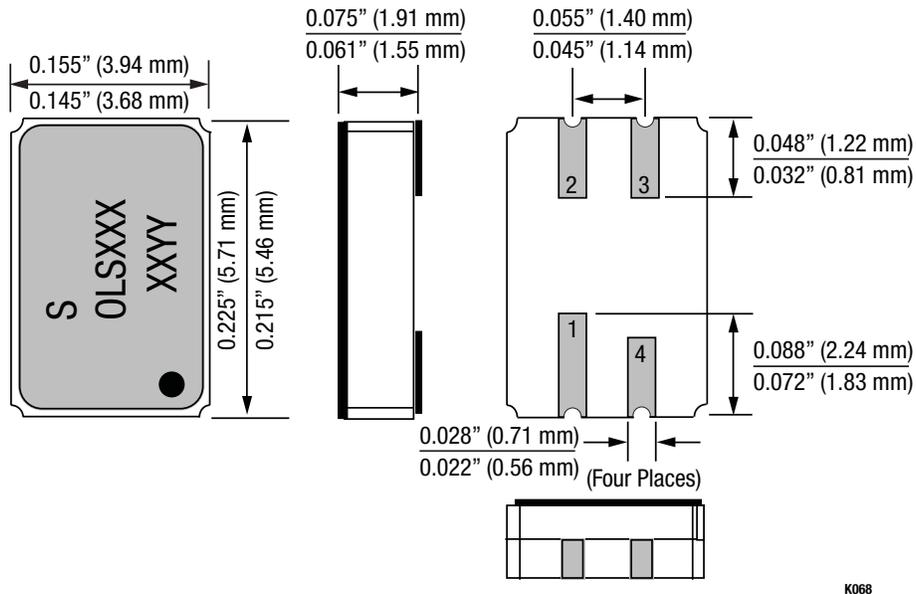


Figure 6. OLS049 Package Dimensions

Ordering Information

Model Name	Manufacturing Part Number
OLS049: Radiation-Tolerant, Phototransistor Hermetic Surface-Mount Optocoupler	OLS049

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