DATA SHEET

OLS049: Radiation-tolerant Phototransistor, Hermetic Surface-mount Optocoupler

Features

- Miniature hermetic surface-mount package
- Radiation tolerant
- High CTR guaranteed over –55 °C to +125 °C ambient temperature range
- 1000 VDC electrical isolation
- High-reliability screening 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 VCE.

Each optocoupler consists of an LED and NPN 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.

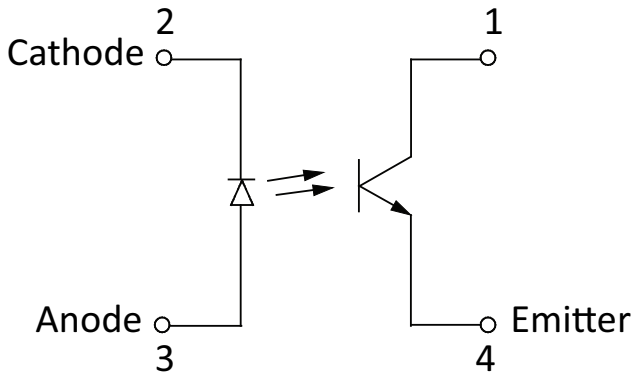

Figure 1. Functional Block Diagram

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

A typical switching test circuit is shown in Figure 2, typical performance characteristics of the OLS049 are illustrated in Figures 3 through 5, and package dimensions are provided in Figure 6.

Electrical and Mechanical Specifications

Table 1. Absolute Maximum Ratings[1]

Parameter	Symbol	Minimum	Maximum	Units
Coupled				
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
Input Diode				
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
Output Detector				
Collector to emitter voltage	V_{CE}		65	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 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 4 shorted together, and pins 2 and 3 shorted together. Ta = 25 °C and duration = 1 s.
3. De-rate linearly at 1 mW/°C above 65 °C.
4. De-rate linearly at 3 mW/°C above 25 °C.

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

Table 2. Electrical Specifications[1]

(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	2	12	mA
		I_F = 2.0 mA, V_{CE} = +5 V, T_A = –55 °C	+2.8		
		I_F = 2 mA, V_{CE} = 5 V, T_A = 100 °C	2		
Saturation voltage	V_{CE_SAT}	I_F = 2.0 mA, I_C = 2.0 mA		0.3	V
Breakdown voltage, collector to emitter	BV_{CEO}	I_{CE} = 1 mA	65		V
Breakdown voltage, emitter to collector	BV_{ECO}	I_{EC} = 100 µA	5		V
Leakage current, collector to emitter	I_{CE_OFF}	V_{CE} = 20 V		100	nA
		V_{CE} = 20 V, T_A = 100 °C		100	µA
Input forward voltage	V_F	I_F = 10.0 mA, T_A = –55 °C	+1.4	+2.0	V
		I_F = 10.0 mA	1.2	1.8	V
		I_F = 10.0 mA, T_A = 100 °C	1.1	1.7	V
Input reverse current	I_R	V_R = 2 V		100	µA
Input output resistance[2]	R_{I_O}	V_{I_O} = ±1000 V_{DC}	10^{11}		Ω
Input output capacitance[2]	C_{I_O}	V_{I_O} = 0 V, f = 1 MHz		5	pF
Time: rise	t_r	V_{CC} = 10 V, R_L = 100 Ω I_F = 10 mA		25	µs
Time: fall	t_f			25	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.

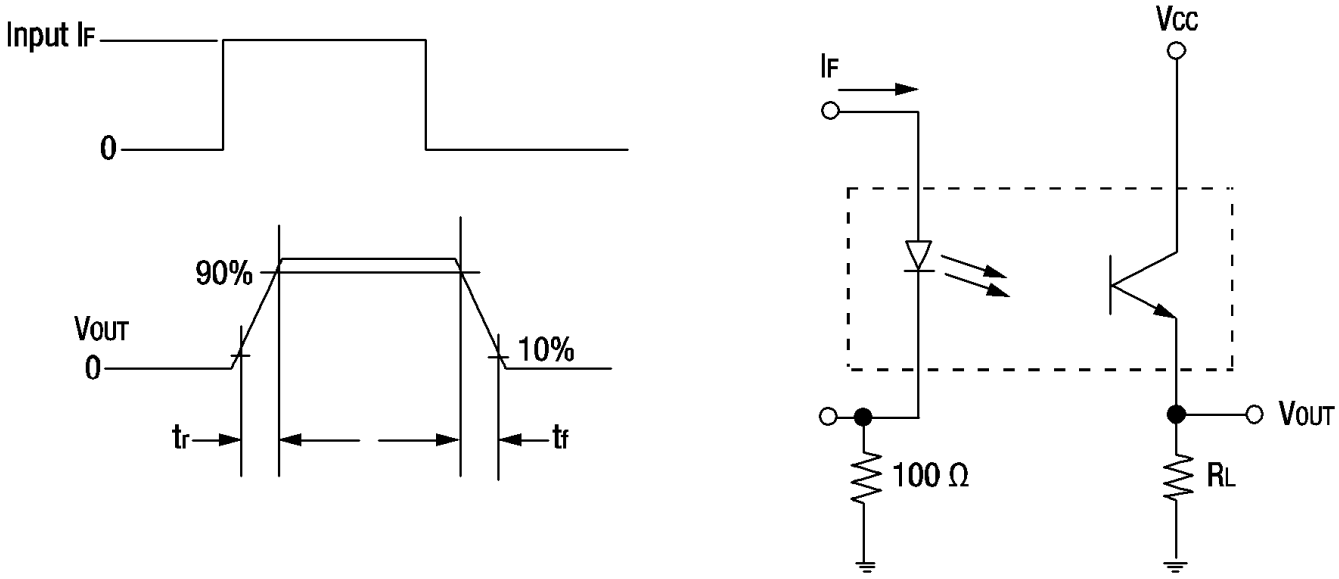

Figure 2. Typical Switching Test Circuit

Typical Performance Characteristics

(T_A = –55 °C to 125 °C, Unless Otherwise Noted)

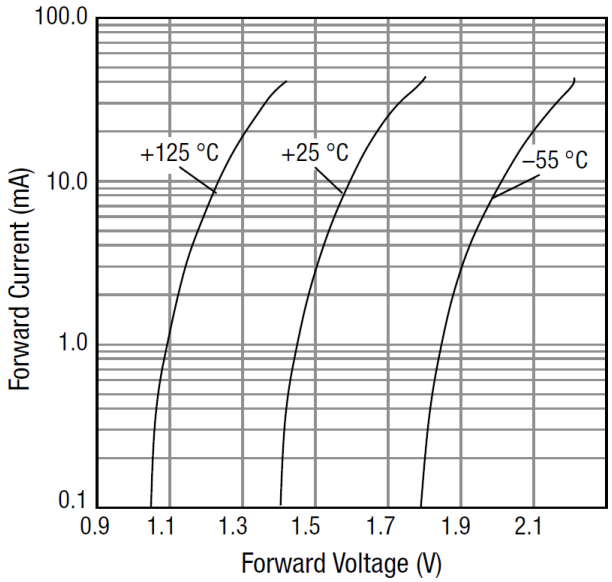

Figure 3. Forward Current vs Forward Voltage

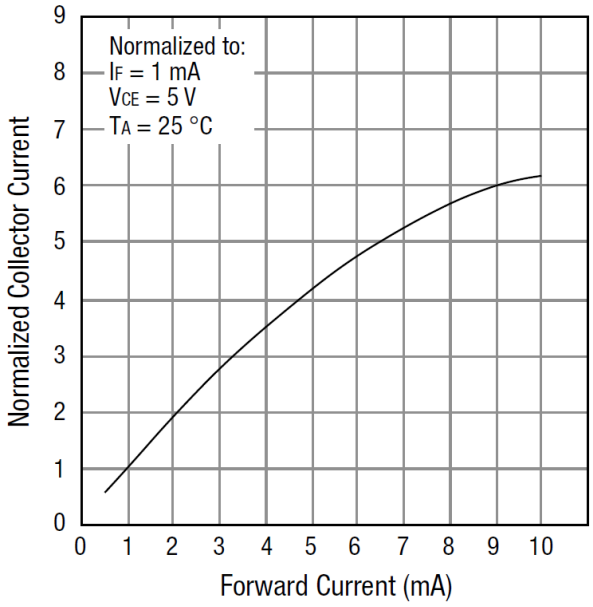

Figure 4. Normalized Collector Current vs Forward Current

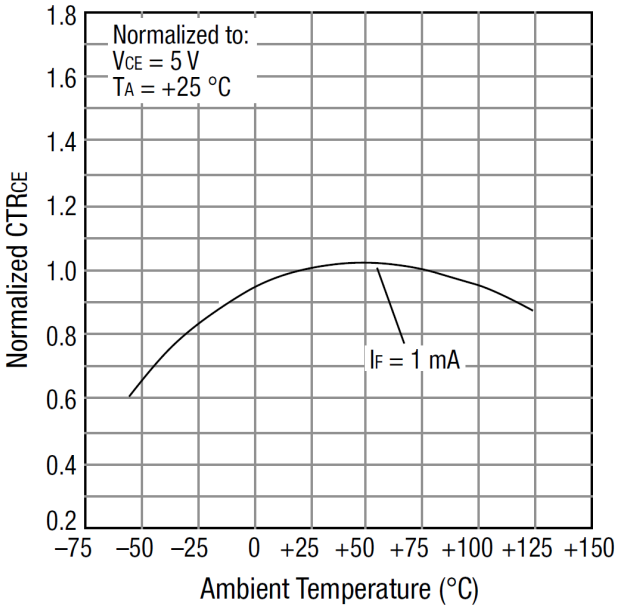

Figure 5. Normalized CTR_{CE} vs Temperature

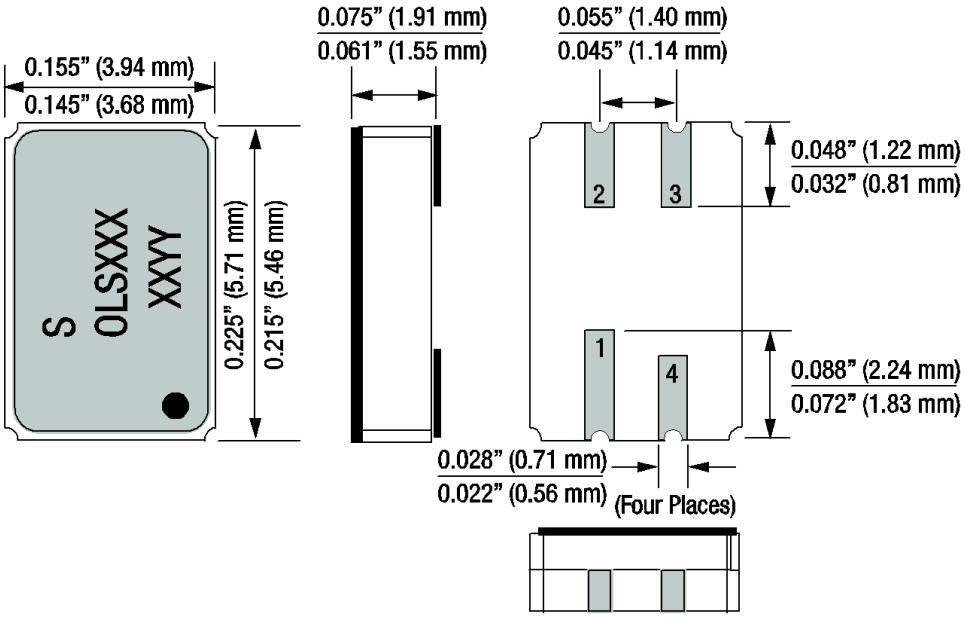

Figure 6. Package Dimensions

Ordering Information

Part Number	Description
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