OLS2449: Dual Channel, Radiation Tolerant, Phototransistor Hermetic Surface Mount Optocoupler

Features

- Same reliable processing and construction as the OLS049, but with a higher current transfer ratio (CTR)
- CTR is:
  - Guaranteed over –55 °C to +100 °C ambient temperature range
  - High at low LED currents
- High BV_{CEO}, 65V minimum
- 1500 V_{DC} electrical isolation
- High-reliability screening is available

Description

The OLS2449 is specifically designed 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 channel consists of an LED and N-P-N silicon phototransistor that is electrically isolated, but optically coupled inside a hermetic eight-pin Leadless Chip Carrier (LCC) package.

The electrical parameters are similar the JEDEC registered 4N49U optocoupler, but with a higher CTR and better CTR degradation characteristics due to radiation exposure.

The OLS2449 has 100 percent high-reliability screening parts available (contact Isolink for more information).

K023a
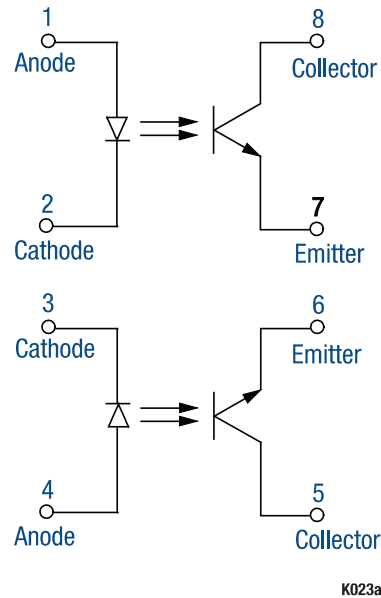
Figure 1. OLS2449 Block Diagram

Figure 1 shows the OLS2449 functional block diagram. Table 1 provides the OLS2449 absolute maximum ratings. Table 2 provides the OLS2449 electrical specifications.

Figures 2 through 4 illustrate the OLS2449 typical performance characteristics. Figure 5 shows the OLS2449 switching test circuit. Figure 6 provides the OLS2449 package dimensions.

Table 1. OLS2449 Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Minimum	Maximum	Units
Coupled				
Input to output isolation voltage (Note 2)	V_{DC}	−1500	+1500	V
Channel to channel isolation voltage (Note 3)		−500	+500	V
Storage temperature range	T_{STG}	−65	+150	°C
Operation temperature range	T_A	−55	+125	°C
Lead temperature for 10 seconds			240	°C
Input Diode				
Average input current (Note 4)	I_{DD}		40	mA
Peak forward current	I_F		1	A
Reverse voltage	V_R		2	V
Power dissipation	P_D		70	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 (Note 5)	P_D		300	mW

Note 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.

Note 2: Measured between pins 1, 2, 3, and 4 shorted together, and pins 5, 6, 7, and 8 shorted together. T_A = 25 °C and duration = 1 s.

Note 3: Measured between pins 1, 2, 7, and 8 shorted together, and pins 3, 4, 5, and 6 shorted together. T_A = 25 °C and duration = 1 s.

Note 4: Value applies for Pw ≤ 1 μs, PRR ≤ 300 pps.

Note 5: Derate linearly at 3 mW/°C above 25 °C.

CAUTION: *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. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions should be used at all times.*


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Table 2. OLS2449 Electrical Specifications (Each Channel) (Note 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	15	40	mA
		I_F = +1 mA, V_{CE} = +5 V, T_A = −55 °C	+7		mA
		I_F = 1 mA, V_{CE} = 5 V, T_A = 100 °C	7		mA
Saturation voltage	V_{CE_SAT}	I_F = 1.0 mA, I_C = 5.0 mA		0.3	V
Breakdown voltage:					
Collector to emitter	BV_{CEO}	I_{CE} = 1 mA	65		V
Emitter to collector	BV_{ECO}	I_{EC} = 100 µA	5		V
Off-state leakage current, collector to emitter	I_{CE_OFF}	V_{CE} = 20 V	100		nA
		V_{CE} = 20 V, T_A = 100 °C	50		µA
Input:					
Forward voltage	V_F	I_F = +10.0 mA, T_A = −55 °C	+1.3	+1.9	V
		I_F = 10.0 mA	1.2	1.7	V
		I_F = 10.0 mA, T_A = 100 °C	1.1	1.6	V
Reverse current	I_R	V_R = 2 V		100	µA
Output resistance (Note 2)	R_{I_O}	V_{I_O} = ±1500 V_{DC}	10^{11}		Ω
Output capacitance (Note 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		25	µs
Fall	t_f	I_F = 5 mA		25	µs

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

Note 2: Measured between pins 1, 2, 3, and 4 shorted together, and pins 5, 6, 7, and 8 shorted together. T_A = 25 °C and duration = 1 s.
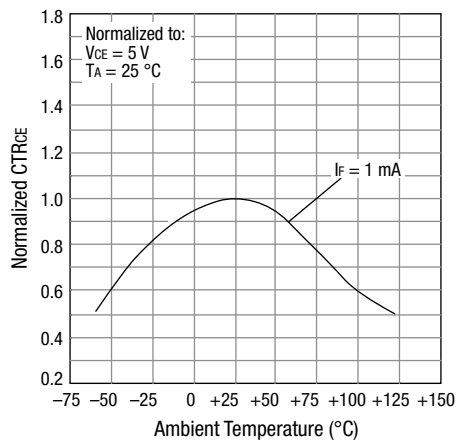
Typical Performance Characteristics
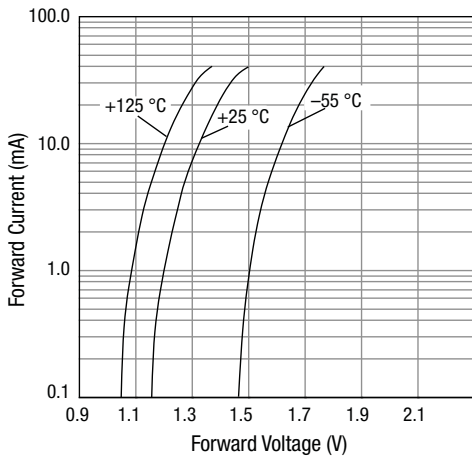
Figure 2. Forward Current vs Diode Forward Voltage
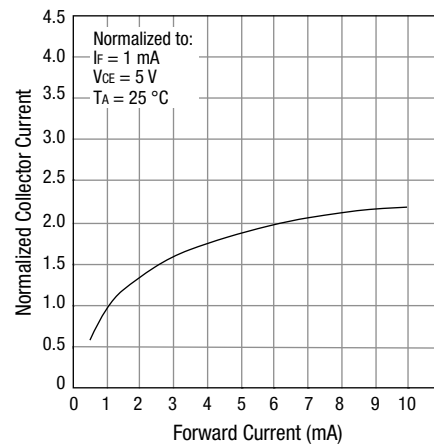
Figure 3. Normalized Collector Current vs Forward Current

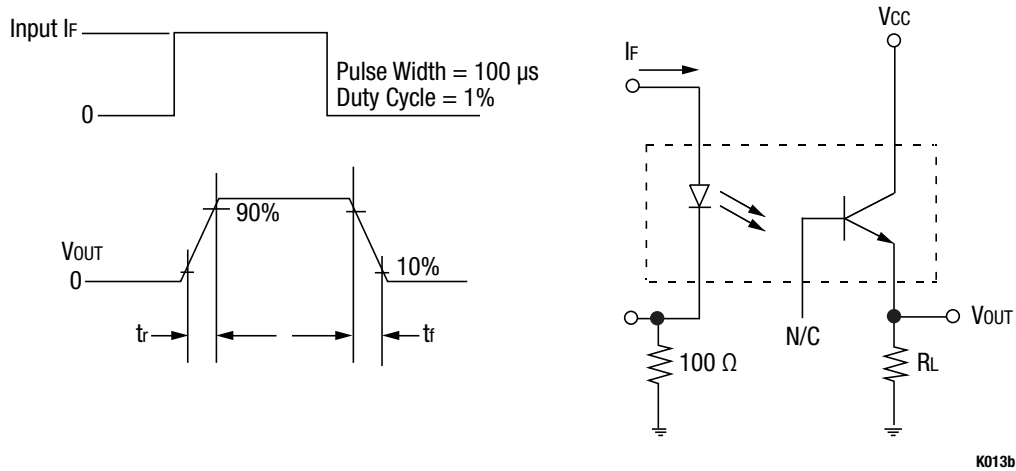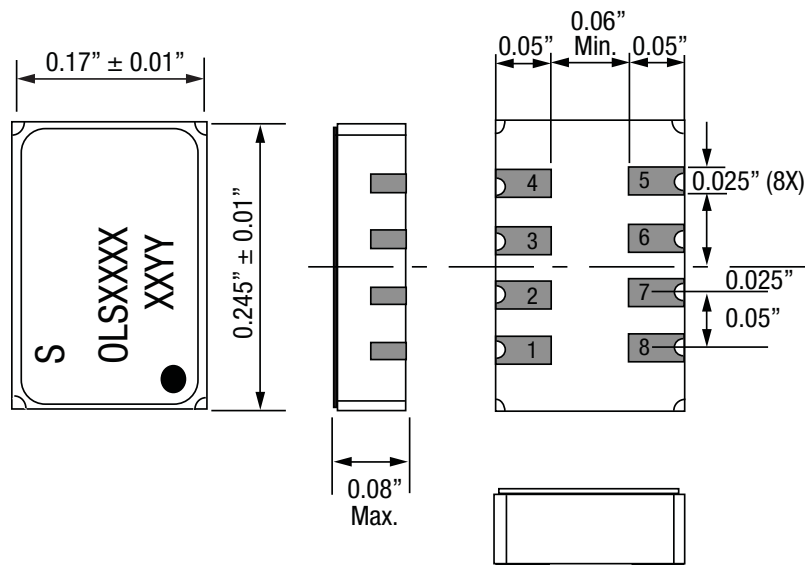**Figure 4. Normalized CTRCE vs Temperature**

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Input I$_F$

Pulse Width = 100 µs
Duty Cycle = 1%

0

90%

V$_{OUT}$
0

10%

t$_r$ t$_f$

V$_{CC}$

I$_F$

N/C

V$_{OUT}$

100 Ω

R$_L$

K013b

Figure 5. OLS2449 Switching Test Circuit

0.17" ± 0.01"

0.245" ± 0.01"

OLSXXXX
XXYY

S

0.08"
Max.

0.06"
Min.

0.05" 0.05"

4   5

3   6

2   7

1   8

0.025" (8X)

0.025"

0.05"

K069

Figure 6. OLS2449 Package Dimensions

Ordering Information

Model Name	Manufacturing Part Number
OLS2449: Dual Channel, Radiation Tolerant, Phototransistor Hermetic Surface Mount Optocoupler	OLS2449

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