

DATA SHEET

OLH249: Radiation-Tolerant, Phototransistor Hermetic Optocoupler

Features

- Radiation-tolerant version of 4N49
- Current Transfer Ratio (CTR) guaranteed over $-55\text{ }^{\circ}\text{C}$ to $+100\text{ }^{\circ}\text{C}$ ambient temperature range
- 1000 VDC electrical isolation
- High CTR
- Standard TO-5 hermetic package
- High reliability screening available

Description

The OLH249 is designed especially 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 consists of an LED and N-P-N silicon phototransistor electrically isolated, but optically coupled inside a hermetic TO-5 package. Electrical parameters are similar to the JEDEC registered 4N49 optocoupler, but have much better CTR degradation characteristics due to radiation exposure (contact IsoLink for more information). The OLH249 has 100 percent high-reliability screened parts available.

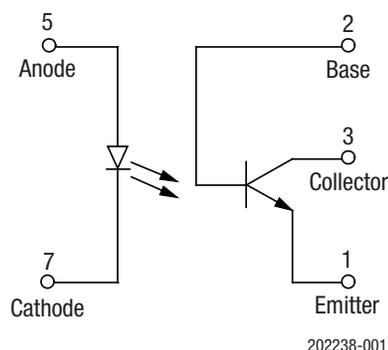


Figure 1. OLH249 Block Diagram

Figure 1 shows the OLH249 functional block diagram. Table 1 provides the OLH249 absolute maximum ratings. Table 2 provides the OLH249 electrical specifications.

Figures 2 through 4 illustrate the OLH249 typical performance characteristics. Figure 5 shows the OLH249 switching test circuit. Figure 6 provides the OLH249 package dimensions.

Table 1. OLH249 Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
<i>Coupled</i>				
Input to output isolation voltage ¹	V _{DC}	-1000	+1000	V
Storage temperature range	T _{STG}	-65	+150	°C
Operating temperature range	T _A	-55	+125	°C
Mounting temperature (10 seconds maximum)	T _{MTG}		+240	°C
<i>Input Diode</i>				
Average input current	I _{DD}		40	mA
Peak forward current ²	I _F		1	A
Reverse voltage	V _R		2	V
<i>Output Detector</i>				
Collector to emitter voltage	V _{CE}		40	V
Emitter to base voltage	V _{EB}		7	V
Collector to base voltage	V _{CB}		45	V
Continuous collector current	I _{CC}		50	mA
Power dissipation ³	P _D		300	mW

¹ Measured between pins 5, 6, and 7 shorted together, and pins 1, 2, and 3 shorted together. T_A = 25 °C and duration = 1 second.

² Value applies for P_w ≤ 1 ms, PRR ≤ 300 pps.

³ Derate linearly at 3.0 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. OLH249 Electrical Specifications¹
(T_A = 25 °C, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Minimum	Maximum	Units
On-state collector current	I _{CC(ON)}	I _F = 1 mA, V _{CE} = 5 V	2.0	12.0	mA
		I _F = 2 mA, V _{CE} = 5 V, T _A = -55 °C	2.8		mA
		I _F = 2 mA, V _{CE} = 5 V, T _A = +125 °C	2.0		mA
On-state collector base current	I _{CCB(ON)}	I _F = 10 mA, V _{CB} = 5 V	30		μA
Saturation voltage	V _{CE_SAT}	I _F = 2 mA, I _{CC} = 2 mA		0.3	V
Breakdown voltage:					
Collector to emitter	BV _{CEO}	I _{CE} = 1 mA	40		V
Collector to base	BV _{CBO}	I _{CB} = 100 μA	45		V
Emitter to base	BV _{EBO}	I _{EB} = 100 μA	7		V
Off-state leakage current:					
Collector to emitter	I _{CE(OFF)}	V _{CE} = 20 V V _{CE} = 20 V, T _A = 125 °C		100 100	nA μA
Collector to base	I _{CB(OFF)}	V _{CB} = 20 V		10	nA
Input forward voltage	V _F	I _F = 10 mA, T _A = -55 °C	1.4	2.0	V
		I _F = 10 mA	1.2	1.8	V
		I _F = 10 mA, T _A = +125 °C	1.1	1.7	V
Input reverse current	I _R	V _R = 2 V		100	μA
Input to output resistance ²	R _{I_O}	V _{I_O} = ±1000 V _{DC}	10 ¹¹		Ω
Input to output capacitance ²	C _{I_O}	V _{I_O} = 0 V, f = 1 MHz		5	pF
Rise time	t _R	V _{CC} = 10 V, R _L = 100 Ω		25	μs
Fall time	t _F	I _F = 5 mA		25	μs

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 5, 6, and 7 shorted together, and pins 1, 2, and 3 shorted together. T_A = 25 °C and duration = 1 second.

Typical Performance Characteristics

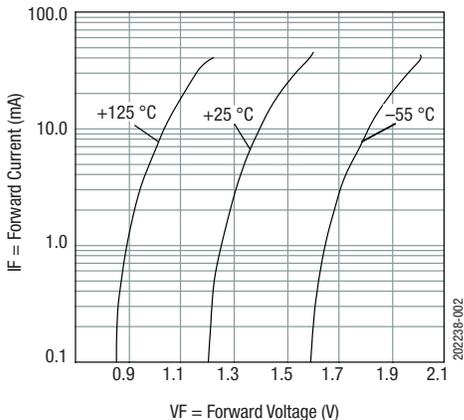


Figure 2. Forward Current vs Diode Forward Voltage

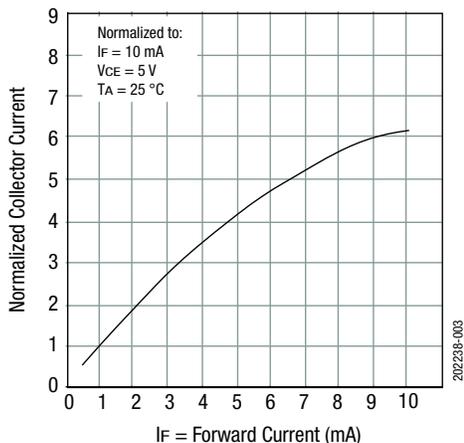


Figure 3. Normalized Collector Current vs Forward Current

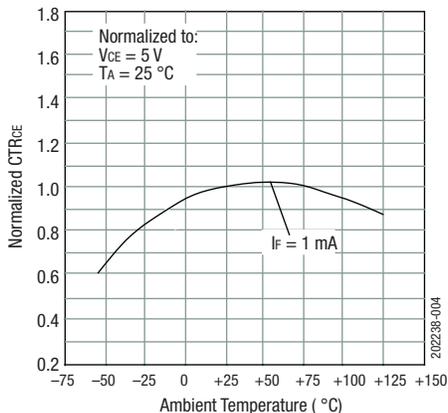
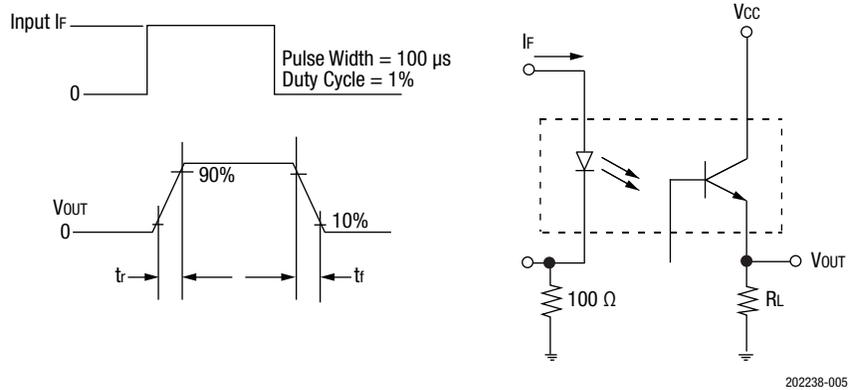


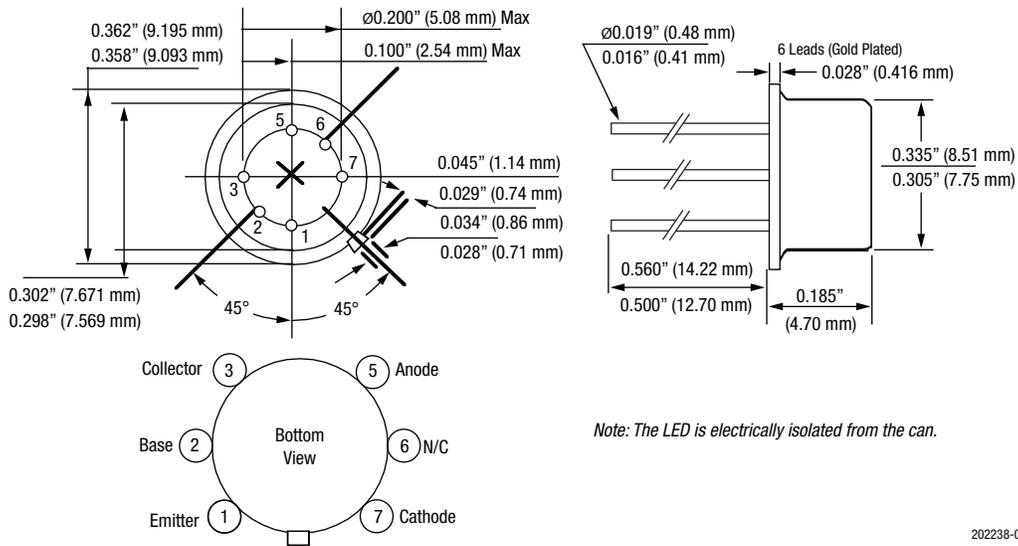
Figure 4. Normalized CTR_{CE} vs Temperature

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Figure 5. OLH249 Switching Test Circuit



Note: The LED is electrically isolated from the can.

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Figure 6. OLH249 Package Dimensions

Ordering Information

Model Name	Manufacturing Part Number
OLH249: Radiation-Tolerant, Phototransistor Hermetic Optocoupler	OLH249

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