

DATA SHEET

OLF249: Radiation Tolerant Phototransistor Hermetic Surface Mount Optocoupler

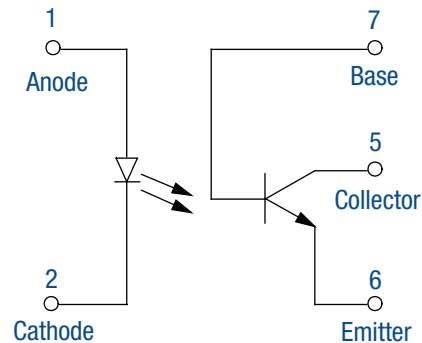
Features

- Hermetic SMT package
- Compliant surface mounting leads
- High current transfer ratio
- Small package size
- High reliability and rugged construction
- High-reliability screening available
- Radiation tolerant

Description

The OLF249 consists of an LED that is optically coupled to an N-P-N silicon phototransistor mounted in an 8-pin hermetic surface mount flat-pack package. The leads can be formed to provide compliant solder connections to the mounting substrate.

Electrical parameters are similar to the JEDEC registered 4N49 optocoupler, but with much better current transfer ratio (CTR) degradation characteristics due to radiation exposure. Special electrical parametric selections are available on request.



Y2256

Figure 1. OLF249 Block Diagram

Figure 1 shows the OLF249 functional block diagram. Table 1 provides the OLF249 absolute maximum ratings. Table 2 provides the OLF249 electrical specifications.

Figures 2 through 4 illustrate the OLF249 typical performance characteristics. Figure 5 shows the OLF249 switching test circuit. Figure 6 provides the OLF249 package dimensions.

Table 1. OLF249 Absolute Maximum Ratings (Note 1)

| Parameter | Symbol | Minimum | Maximum | Units |
|---|------------------|---------|---------|-------|
| <i>Coupled</i> | | | | |
| Input to output isolation voltage (Note 2) | V _{DC} | | ±1000 | V |
| Storage temperature | T _{STG} | -65 | +150 | °C |
| Operating temperature | T _A | -55 | +125 | °C |
| Mounting temperature (10 seconds maximum) | T _{MTG} | | +240 | °C |
| <i>Input Diode</i> | | | | |
| Average input current (Note 3) | I _{DD} | | 40 | mA |
| Peak forward current (≤ 1 ms duration) (Note 4) | 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 (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 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.

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 second.

Note 3: Derate linearly to 125 °C free-air temperature at 0.67 mA/°C above 65 °C.

Note 4: For pulse width ≤ 1 μs, pulse repetition rate ≤ 300 pps.

Note 5: Derate linearly to 125 °C free-air temperature at 3.0 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.

Table 2. OLF249 Electrical Specifications (Note 1)
(T_A = 25 °C, Unless Otherwise Noted)

| Parameter | Symbol | Test Condition | Minimum | Maximum | Units |
|-----------------------------|---------------------|--|-------------------|-------------------|----------------|
| On-state: | | | | | |
| Collector current | I _{C_ON} | I _F = 1 mA, V _{CE} = 5 V I _F = +2 mA, V _{CE} = +5 V, T _A = -55 °C I _F = 2 mA, V _{CE} = 5 V, T _A = 100 °C | 2.0 2.8 2.0 | 12.0 | mA mA mA |
| Collector base current | I _{CB_ON} | I _F = 10 mA, V _{CB} = 5 V | 30 | | μA |
| Saturation voltage | V _{CE_SAT} | I _F = 2 mA, I _C = 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 | | |
| Emitter to base | BV _{EBO} | I _{EB} = 100 μA | 7 | | |
| Off-state leakage current: | | | | | |
| Collector to emitter | I _{CE_OFF} | V _{CE} = 20 V V _{CE} = 20 V, T _A = 100 °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 I _F = 10 mA I _F = 10 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 (Note 2) | r _{i_0} | V _{I-0} = ±1000 V _{DC} | 10 ¹¹ | | Ω |
| Output capacitance (Note 2) | C _{i_0} | V _{I-0} = 0 V, f = 1 MHz | | 5 | pF |
| Times: | | | | | |
| 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 second.

Typical Performance Characteristics

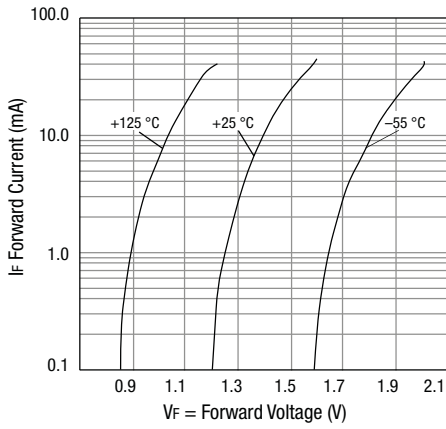


Figure 2. Forward Current vs Diode Forward Voltage

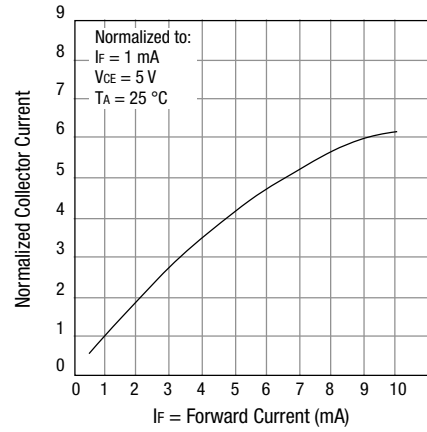


Figure 3. Normalized Collector Current vs Forward Current

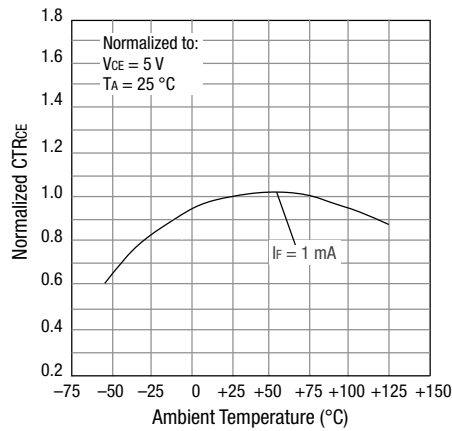
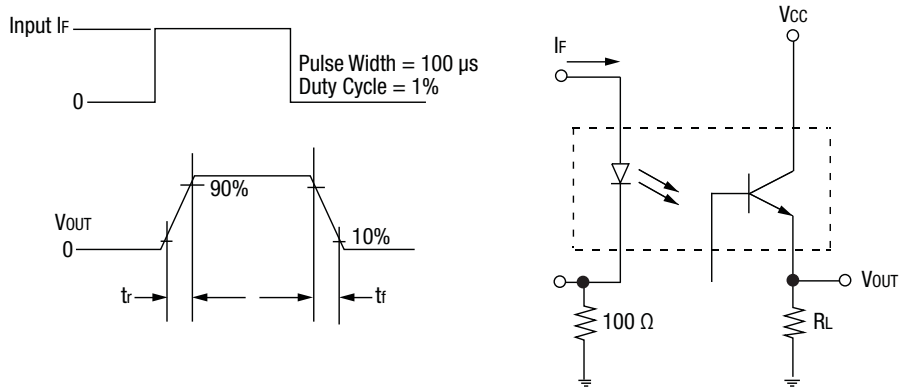


Figure 4. Normalized CTR_{CE} vs Temperature



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Figure 5. OLF249 Switching Test Circuit

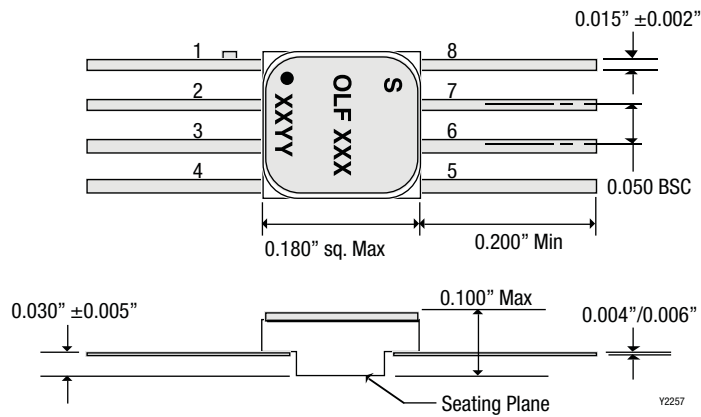


Figure 6. OLF249 Package Dimensions

Ordering Information

| Model Name | Manufacturing Part Number |
|---|---------------------------|
| OLF249: Radiation Tolerant Phototransistor Hermetic Surface Mount Optocoupler | OLF249 |

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