

OLS0449, OLS2449: Radiation-Tolerant Phototransistor, Hermetic Surface-Mount Optocouplers

Applications

- Aerospace
- Defense
- Industrial
- Commercial

Features

- High current transfer ratio (CTR) assured over -55°C to $+125^{\circ}\text{C}$
- Low input current, 1 mA
- High BV_{CEO} , 65 V minimum
- Small footprint, hermetic LCC4 and LCC8 packages
- Radiation tolerant version of 4N49U
- High-reliability screening available
 - MIL-STD-883 Class B equivalent
 - MIL-PRF-19500 JAN, JANTX, JANTXV, JANS equivalent
 - MIL-PRF-38534 Class H, K equivalent
 - Per customer requirements
- For RoHS and other product compliance information, see the [Skyworks Certificate of Conformance](#).

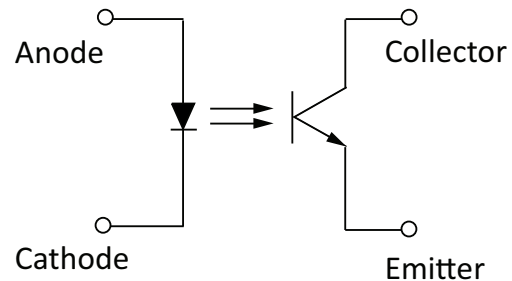


Figure 1. Functional Block Diagram

Electrical parameters are comparable to the JEDEC registered 4N49 optocoupler, but with a higher CTR and better CTR degradation characteristics due to radiation exposure.

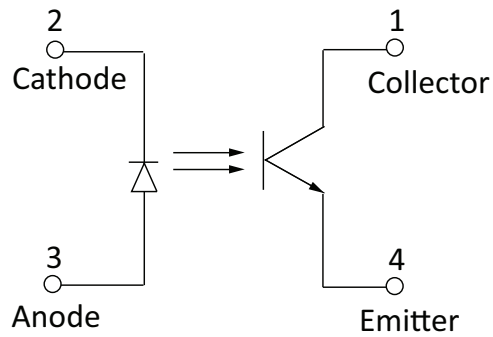
OLS0449 and OLS2449 devices are offered as unscreened versions as well as screened to customer requirements, including MIL-STD-883 Class B equivalent, MIL-PRF-19500 JAN, JANTX, JANTXV, JANS equivalent and MIL-PRF-38534 Class H, K equivalent.

Description

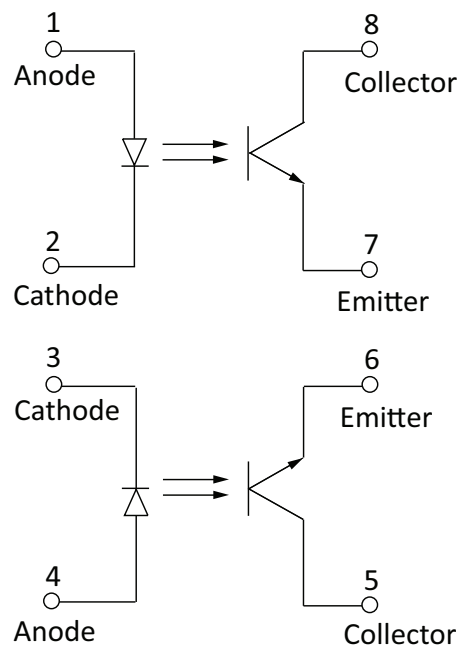
The OLS0449 and OLS2449 are specifically designed for low input current applications that require optical isolation in radiation environments such as gamma, neutron, and proton radiation with a high CTR and low saturation V_{CE} .

Each optocoupler consists of an LED and NPN silicon phototransistor that is electrically isolated, but optically coupled inside a hermetic package.

The OLS0449 is a single-channel device in a 4-pin (LCC4) while the OLS2449 is a dual-channel device in an 8-pin (LCC8) package.



Hermetic 4-Lead LCC (OLS0449YYY-N)



Hermetic 8-Lead LCC (OLS2449YYY-N)

Figure 2. Pinouts

Electrical and Mechanical Specifications

Table 1. Absolute Maximum Ratings¹
(T_A = 25 °C, unless otherwise noted)

| Parameter | Symbol | Conditions | Min | Max | Units |
|--|----------------------------------|--|-------|------|-------|
| Input | | | | | |
| Average forward current | I _{DD} | | | 40 | mA |
| Peak forward current | I _F | Pulse width ≤ 1 μs, PRR ≤ 300 pps | | 1 | A |
| Reverse voltage | V _R | | | 2 | V |
| Input power dissipation | P _D | | | 70 | mW |
| Output | | | | | |
| Collector to emitter voltage | V _{CEO} | | | 65 | V |
| Emitter to collector voltage | V _{ECO} | | | 5 | V |
| Continuous collector current | I _{CC} | | | 50 | mA |
| Output power dissipation | P _D | | | 300 | mW |
| Output power dissipation derating | ΔP _O /ΔT _A | T _A ≥ 25 °C | | 3.0 | mW/°C |
| Coupler | | | | | |
| Input to output isolation voltage ² | V _{DC} | T _A = 25 °C, duration = 1 s, OLS2449 | -1500 | 1500 | V |
| | | T _A = 25 °C, duration = 1 s, OLS0449 | -1000 | 1000 | |
| Channel to channel isolation voltage ³ | | T _A = 25 °C, duration = 1 s, OLS2449 only | -500 | 500 | V |
| Storage temperature range | T _{STG} | | -65 | 150 | °C |
| Operating temperature range | T _A | | -55 | 125 | °C |
| Soldering temperature | T _{SLD} | < 10 seconds | | 240 | °C |
| Electrostatic Discharge | | | | | |
| MIL-STD-883, Method 3015 Human Body Model (HBM) | ESD | Class 1C rating | | 2000 | V |

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. OLS0449: Measured between pins 2 and 3 shorted together, and pins 1 and 4 shorted together.
OLS2449: Measured between pins 1, 2, 3, and 4 shorted together, and pins 5, 6, 7, and 8 shorted together.
3. OLS2449: Measured between pins 1, 2, 7, and 8 shorted together, and pins 3, 4, 5, and 6 shorted together.

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

Table 2. Electrical Specifications, Each Channel¹(T_A = 25 °C, unless otherwise noted)

| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|--|---------------------|---|------|------------------|------|-------|
| Input | | | | | | |
| Forward voltage | V _F | I _F = 10.0 mA, 25 °C | 1.2 | | 1.7 | V |
| | | I _F = 10.0 mA, 125 °C | 1.1 | | 1.6 | |
| | | I _F = 10.0 mA, −55 °C | 1.3 | | 1.9 | |
| Reverse current | I _R | V _R = 2 V | | | 100 | μA |
| Output | | | | | | |
| Collector to emitter breakdown voltage | BV _{CEO} | I _{CE} = 1 mA | 65 | | | V |
| Emitter to collector breakdown voltage | BV _{ECO} | I _{EC} = 100 μA | 5 | | | V |
| Collector to emitter dark current | I _{CE_OFF} | I _F = 0 mA, V _{CE} = 20 V, 25 °C | | | 100 | nA |
| | | I _F = 0 mA, V _{CE} = 20 V, 100 °C | | 50 | | μA |
| | | I _F = 0 mA, V _{CE} = 20 V, 125 °C | | | 100 | |
| Coupler | | | | | | |
| Current transfer ratio (I _C /I _F) | CTR | I _F = 1 mA, V _{CE} = 5 V, 25 °C | 1500 | | 4000 | % |
| | | I _F = 1 mA, V _{CE} = 5 V, 125 °C | 700 | | | |
| | | I _F = 1 mA, V _{CE} = 5 V, −55 °C | 700 | | | |
| Collector emitter saturation voltage | V _{CE_SAT} | I _F = 1 mA, I _C = 5 mA | | | 0.3 | V |
| Input-output resistance ² | R _{I-O} | OLS2449, V _{I-O} = ±1500 V _{DC} | | 10 ¹¹ | | Ω |
| | | OLS0449, V _{I-O} = ±1000 V _{DC} | | | | |
| Input-output capacitance ² | C _{I-O} | V _{I-O} = 0 V, f = 1 MHz | | | 5 | pF |
| Switching Characteristics | | | | | | |
| Rise time | t _r | V _{CC} = 10 V, I _F = 5 mA, R _L = 100 Ω | | | 25 | μs |
| Fall time | t _f | | | | 25 | μs |

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

2. OLS0449: Measured between pins 1, 2, and 6 shorted together, and pins 3, 4, and 5 shorted together.

OLS2449: 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

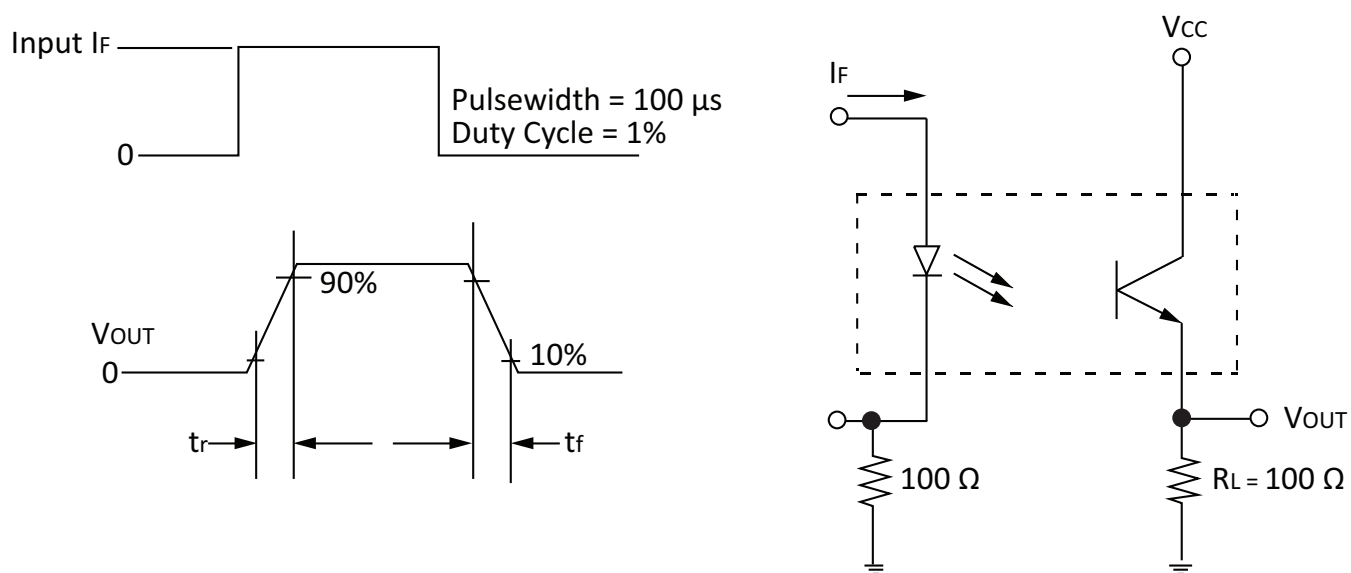


Figure 3. Switching Test Circuit

Typical Performance Characteristics ($T_A = 25\text{ }^{\circ}\text{C}$, Unless Otherwise Indicated)

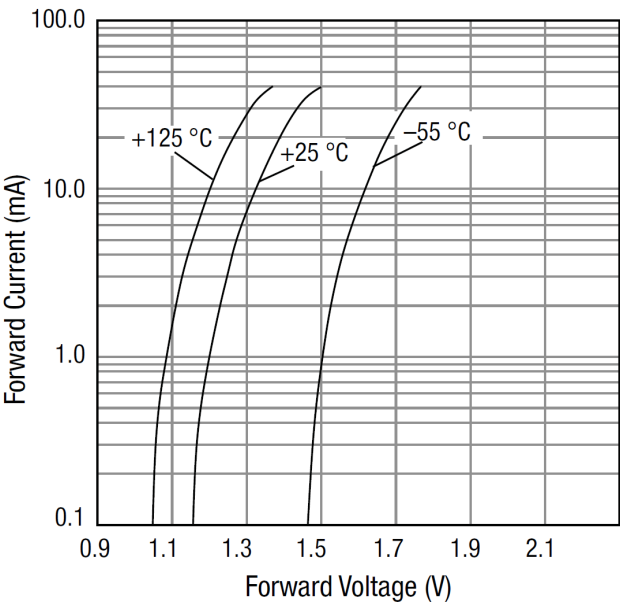


Figure 4. Forward Current vs Diode Forward Voltage

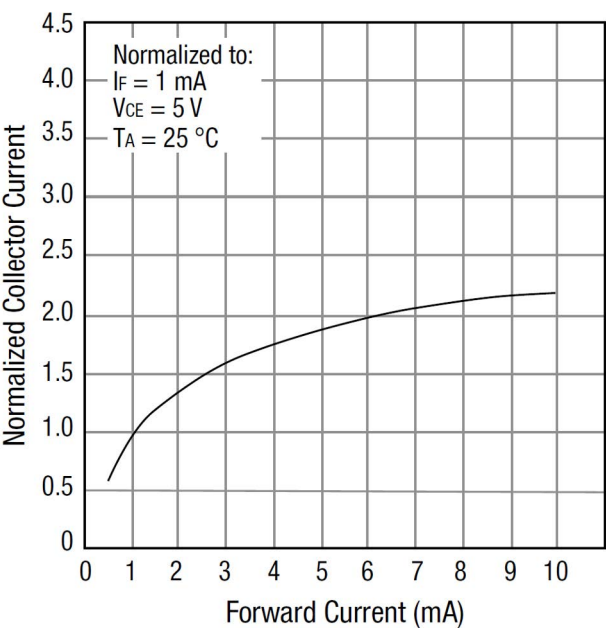


Figure 5. Normalized Collector Current vs Forward Current

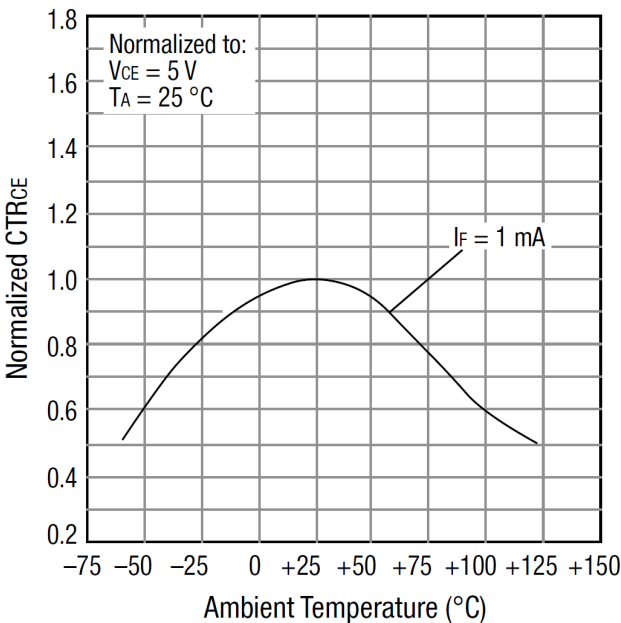


Figure 6. Normalized CTR vs Temperature

Package and Handling Information

Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment.

For additional information, refer to the Skyworks Application Note, Solder Reflow Information, document number 200164.

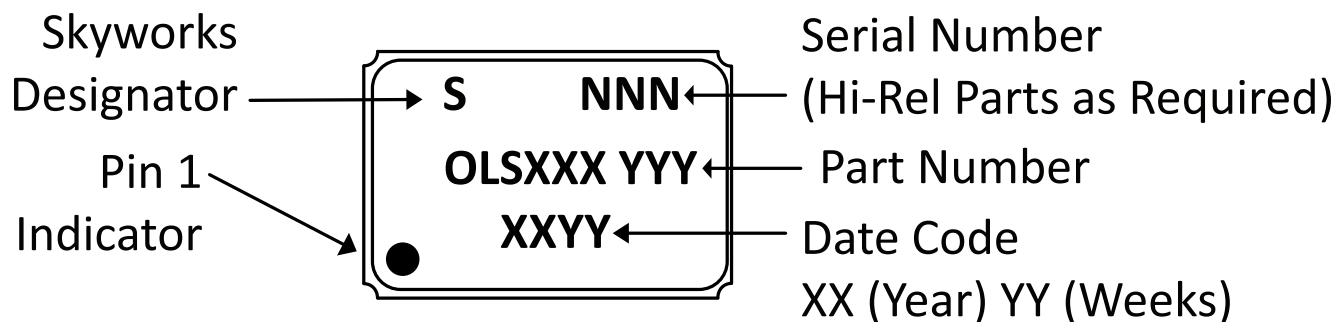


Figure 7. Typical Part Marking, 4-Lead LCC

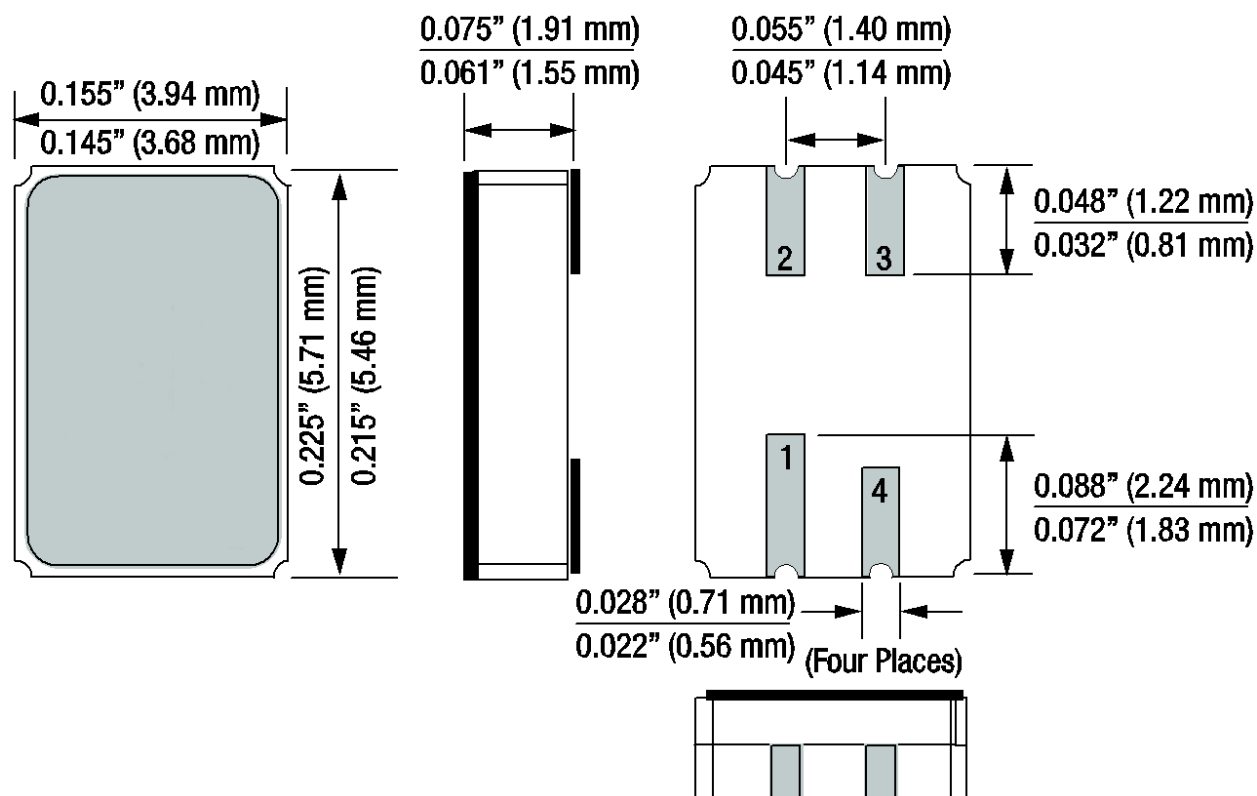


Figure 8. Package Dimensions, 4-Lead LCC

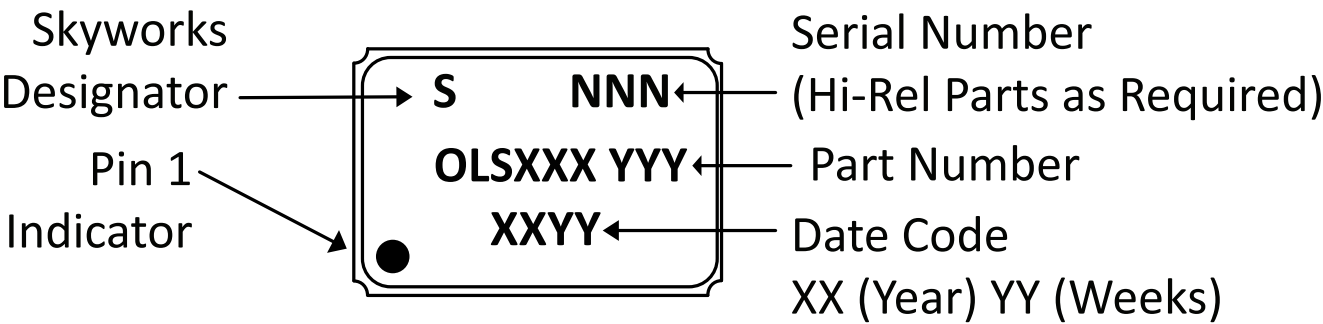


Figure 9. Typical Part Marking, 8-Lead LCC

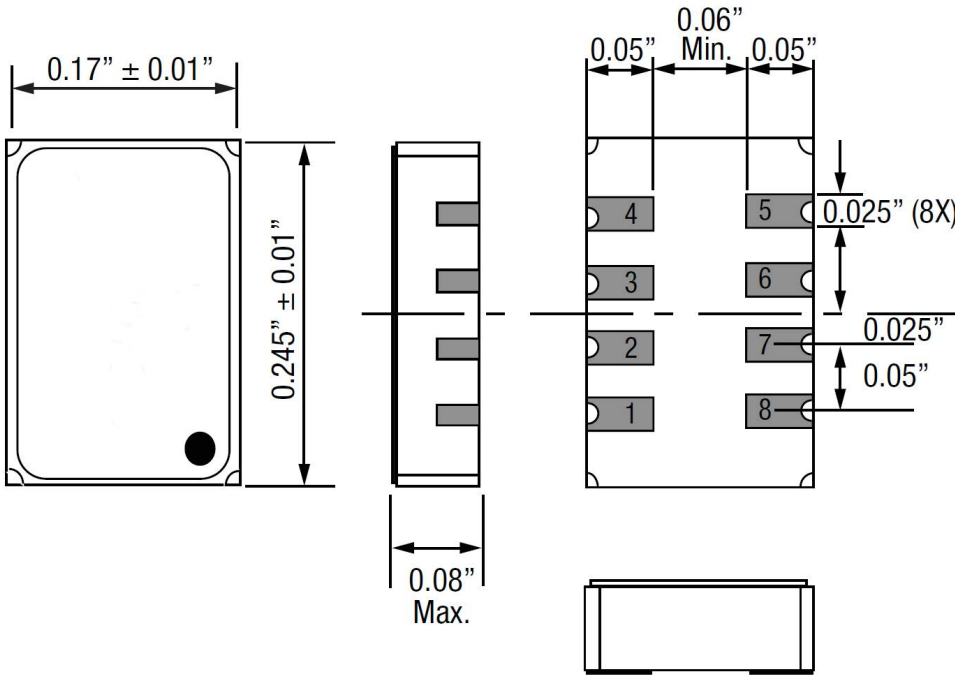


Figure 10. Package Dimensions, 8-Lead LCC

Table 3. Additional Package Information

| Lead Style | 4-lead LCC (OLS0449YYY-N) | 8-lead LCC (OLS2449YYY-N) |
|---------------------|-----------------------------------|----------------------------------|
| | Surface mount | Surface mount |
| Lead finish/plating | Min 100 μin Au over min 80 μin Ni | Min 60 μin Au over min 80 μin Ni |
| Lead thickness | N/A | N/A |
| Hermetic | Yes | Yes |
| CAGE code OJGG3 | | |

Ordering Information

| | | | | | | | | | |
|------------------------------|---|---|---|--------------|---|---|---------------------|---|---|
| OLS | 0 | 4 | 4 | 9 | Y | Y | Y | - | N |
| Number of Channels Indicator | | | | Screen Level | | | Lead/Packing Option | | |

| | | | | | | | | | |
|------------------------------|---|---|---|--------------|---|---|---------------------|---|---|
| OLS | 2 | 4 | 4 | 9 | Y | Y | Y | - | N |
| Number of Channels Indicator | | | | Screen Level | | | Lead/Packing Option | | |

Table 4. Related Parts

| Part Number | Package | Description | Comments |
|-------------|------------|--|--|
| OLS249 | 6-lead LCC | Radiation tolerant phototransistor, hermetic surface mount optocoupler with no base connection | High CTR assured over -55 °C to 125 °C, 1500 VDC isolation voltage |
| OLS449 | 6-lead LCC | Radiation tolerant phototransistor, hermetic surface mount optocoupler with base connection | High CTR assured over -55 °C to 125 °C, 1500 VDC isolation voltage |
| OLS2249 | 8-lead LCC | Radiation tolerant phototransistor, hermetic surface mount optocoupler with no base connection | High CTR assured over -55 °C to 125 °C, 1500 VDC isolation voltage |

| | Hermetic 4-Lead LCC (Single-Channel) | Hermetic 8-Lead LCC (Dual-Channel) |
|--|--------------------------------------|------------------------------------|
| Catalog | OLS0449 | OLS2449 |
| MIL-STD-883 Class B equivalent | OLS0449SB | OLS2449SB |
| JANTX equivalent | OLS0449SX | OLS2449SX |
| JANTXV equivalent | OLS0449SXV | OLS2449SXV |
| JANS equivalent | OLS0449PS | OLS2449PS |
| Non-solder dipped and standard packing | Blank | Blank |
| Solder dipped | -1 | -1 |
| Tape and reel | -2 | -2 |
| Solder dip and tape and reel | -3 | -3 |
| Standard packing | Tubes | Tubes |

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