



**SKYWORKS®**

DATA SHEET

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

### Applications

- Aerospace
- Defense
- Industrial
- Commercial

### Features

- High current transfer ratio (CTR) assured over  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Low input current, 1 mA
- High  $\text{BV}_{\text{CEO}}$ , 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](#).

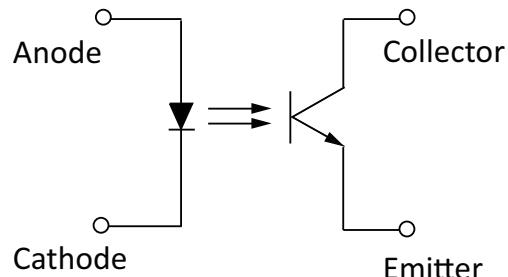


Figure 1. Functional Block Diagram

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

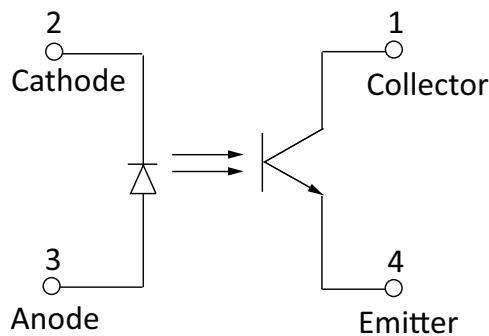
OLS0449 and OLS2449 devices are offered as unscreened versions as well as screened to customer requirements, including MIL-STD-883 Class B equivalent, MIL-PRF-19500 JAN, JANTX, JANTXV, JANS equivalent and MIL-PRF-38534 Class H, K equivalent.

### Description

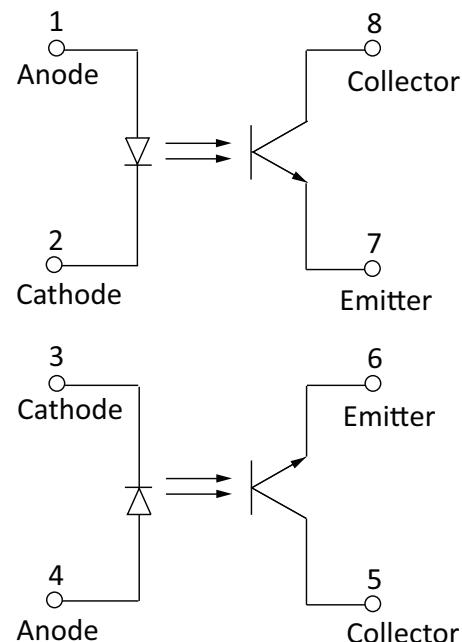
The OLS0449 and OLS2449 are specifically designed for low input current applications that require optical isolation in radiation environments such as gamma, neutron, and proton radiation with a high CTR and low saturation  $\text{V}_{\text{CE}}$ .

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 Ratings<sup>1</sup>**  
( $T_A = 25^\circ\text{C}$ , unless otherwise noted)

Parameter	Symbol	Conditions	Min	Max	Units
<b>Input</b>					
Average forward current	$I_{DD}$			40	mA
Peak forward current	$I_F$	Pulse width $\leq 1\ \mu\text{s}$ , PRR $\leq 300$ pps		1	A
Reverse voltage	$V_R$			2	V
Input power dissipation	$P_D$			70	mW
<b>Output</b>					
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	$\Delta P_O / \Delta T_A$	$T_A \geq 25^\circ\text{C}$		3.0	mW/ $^\circ\text{C}$
<b>Coupler</b>					
Input to output isolation voltage <sup>2</sup>	$V_{DC}$	$T_A = 25^\circ\text{C}$ , duration = 1 s, OLS2449	-1500	1500	V
		$T_A = 25^\circ\text{C}$ , duration = 1 s, OLS0449	-1000	1000	
Channel to channel isolation voltage <sup>3</sup>		$T_A = 25^\circ\text{C}$ , duration = 1 s, OLS2449 only	-500	500	V
Storage temperature range	$T_{STG}$		-65	150	$^\circ\text{C}$
Operating temperature range	$T_A$		-55	125	$^\circ\text{C}$
Soldering temperature	$T_{SLD}$	< 10 seconds		240	$^\circ\text{C}$
<b>Electrostatic Discharge</b>					
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 Channel<sup>1</sup>**  
( $T_A = 25^\circ\text{C}$ , unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Input</b>						
Forward voltage	$V_F$	$I_F = 10.0 \text{ mA}, 25^\circ\text{C}$	1.2		1.7	V
		$I_F = 10.0 \text{ mA}, 125^\circ\text{C}$	1.1		1.6	
		$I_F = 10.0 \text{ mA}, -55^\circ\text{C}$	1.3		1.9	
Reverse current	$I_R$	$V_R = 2 \text{ V}$			100	$\mu\text{A}$
<b>Output</b>						
Collector to emitter breakdown voltage	$BV_{CEO}$	$I_{CE} = 1 \text{ mA}$	65			V
Emitter to collector breakdown voltage	$BV_{ECO}$	$I_{EC} = 100 \mu\text{A}$	5			V
Collector to emitter dark current	$I_{CE\_OFF}$	$I_F = 0 \text{ mA}, V_{CE} = 20 \text{ V}, 25^\circ\text{C}$			100	nA
		$I_F = 0 \text{ mA}, V_{CE} = 20 \text{ V}, 100^\circ\text{C}$		50		$\mu\text{A}$
		$I_F = 0 \text{ mA}, V_{CE} = 20 \text{ V}, 125^\circ\text{C}$			100	
<b>Coupler</b>						
Current transfer ratio ( $I_C/I_F$ )	CTR	$I_F = 1 \text{ mA}, V_{CE} = 5 \text{ V}, 25^\circ\text{C}$	1500		4000	%
		$I_F = 1 \text{ mA}, V_{CE} = 5 \text{ V}, 125^\circ\text{C}$	700			
		$I_F = 1 \text{ mA}, V_{CE} = 5 \text{ V}, -55^\circ\text{C}$	700			
Collector emitter saturation voltage	$V_{CE\_SAT}$	$I_F = 1 \text{ mA}, I_C = 5 \text{ mA}$			0.3	V
Input-output resistance <sup>2</sup>	$R_{I-O}$	$OLS2449, V_{I-O} = \pm 1500 \text{ V}_{\text{DC}}$		$10^{11}$		$\Omega$
		$OLS0449, V_{I-O} = \pm 1000 \text{ V}_{\text{DC}}$				
Input-output capacitance <sup>2</sup>	$C_{I-O}$	$V_{I-O} = 0 \text{ V}, f = 1 \text{ MHz}$			5	$\text{pF}$
<b>Switching Characteristics</b>						
Rise time	$t_r$	$V_{CC} = 10 \text{ V}, I_F = 5 \text{ mA}, R_L = 100 \Omega$			25	$\mu\text{s}$
Fall time	$t_f$				25	$\mu\text{s}$

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.

$T_A = 25^\circ\text{C}$ , and duration = 1 s

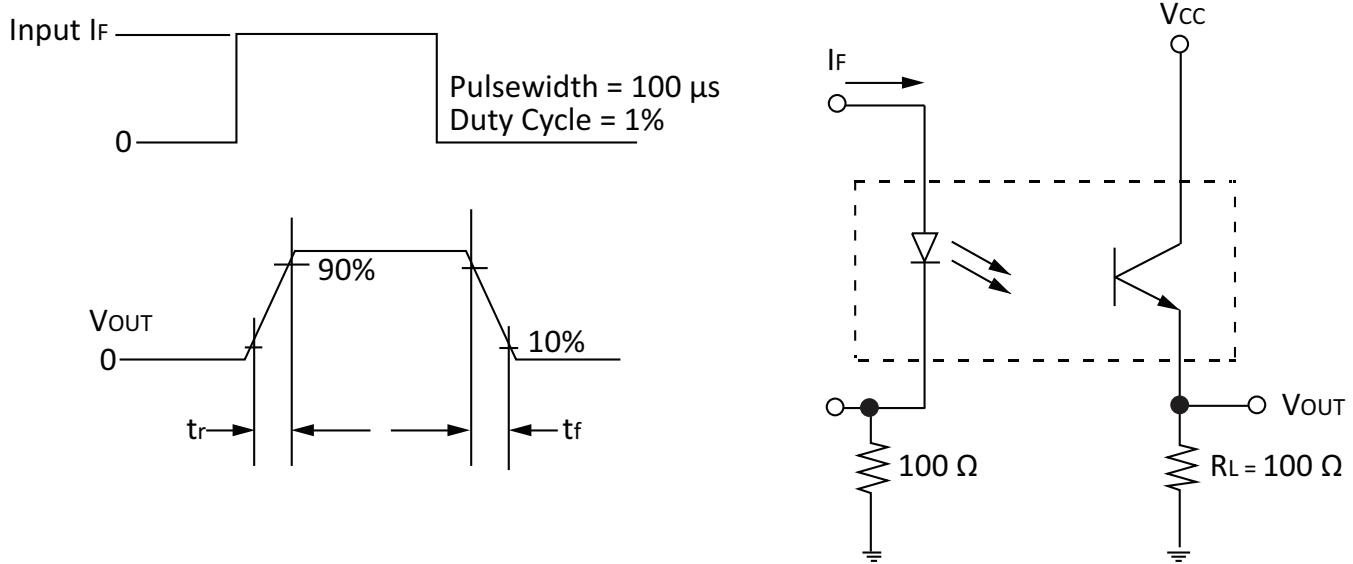


Figure 3. Switching Test Circuit

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

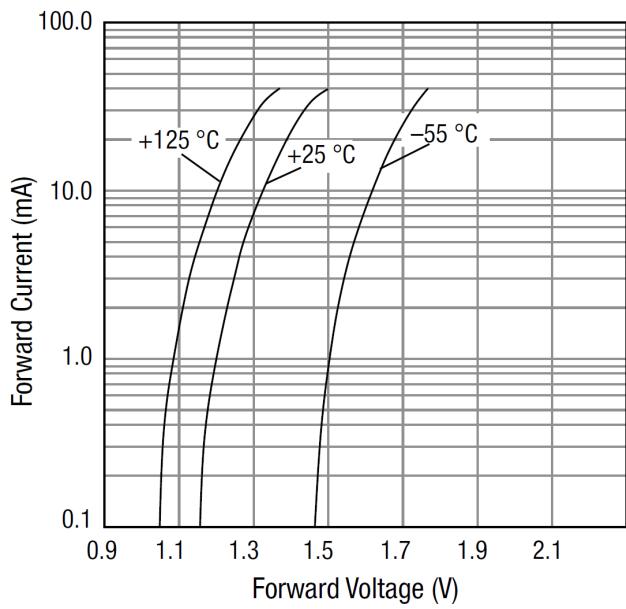


Figure 4. Forward Current vs Diode Forward Voltage

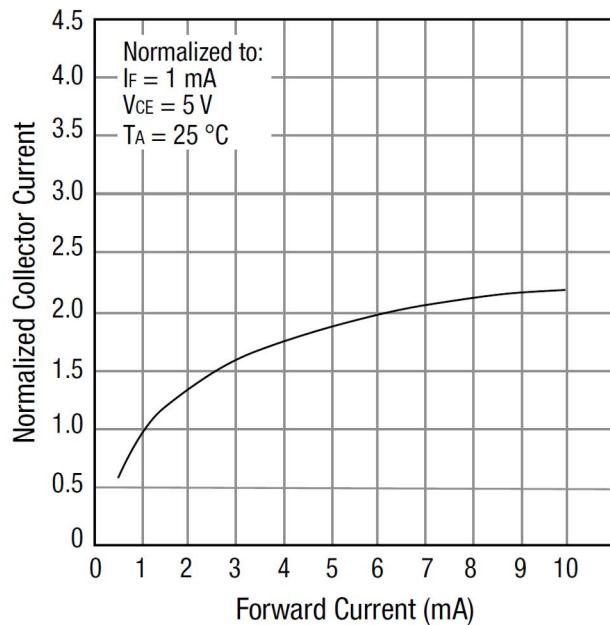


Figure 5. Normalized Collector Current vs Forward Current

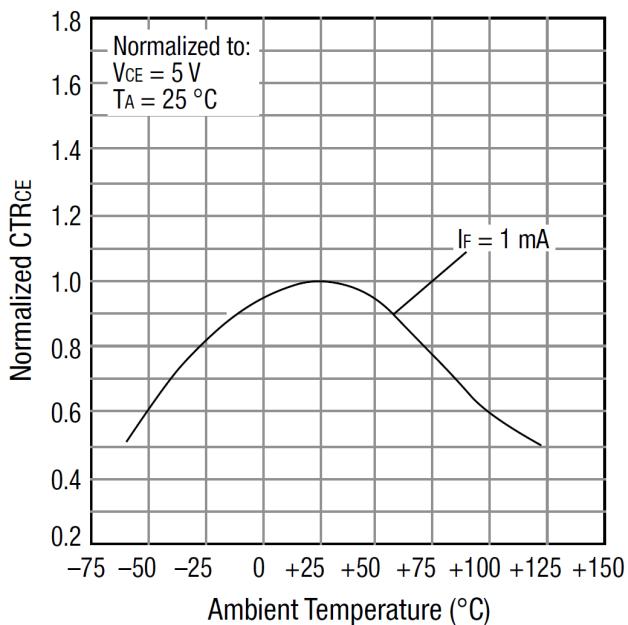


Figure 6. Normalized CTR vs Temperature

## 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.

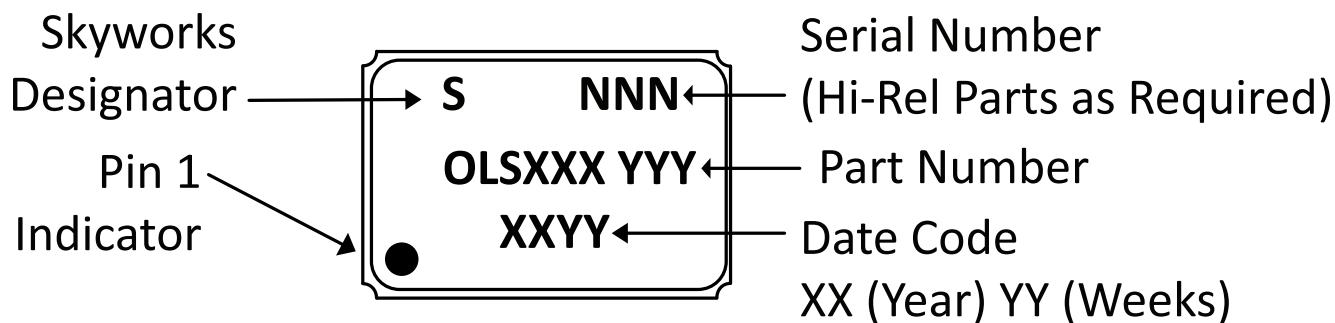


Figure 7. Typical Part Marking, 4-Lead LCC

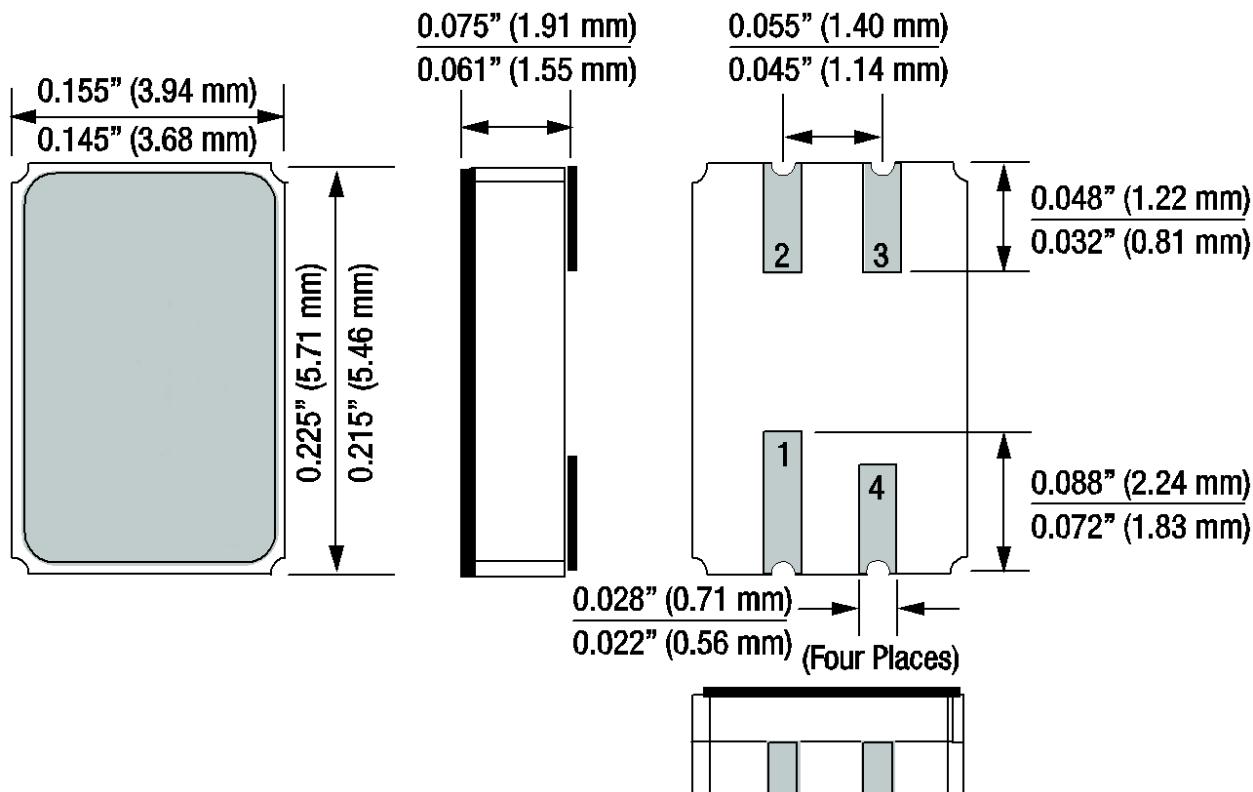
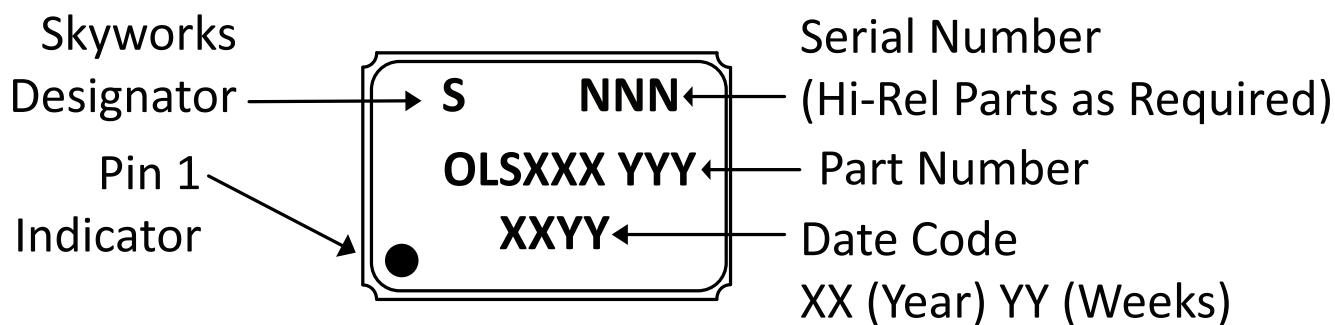
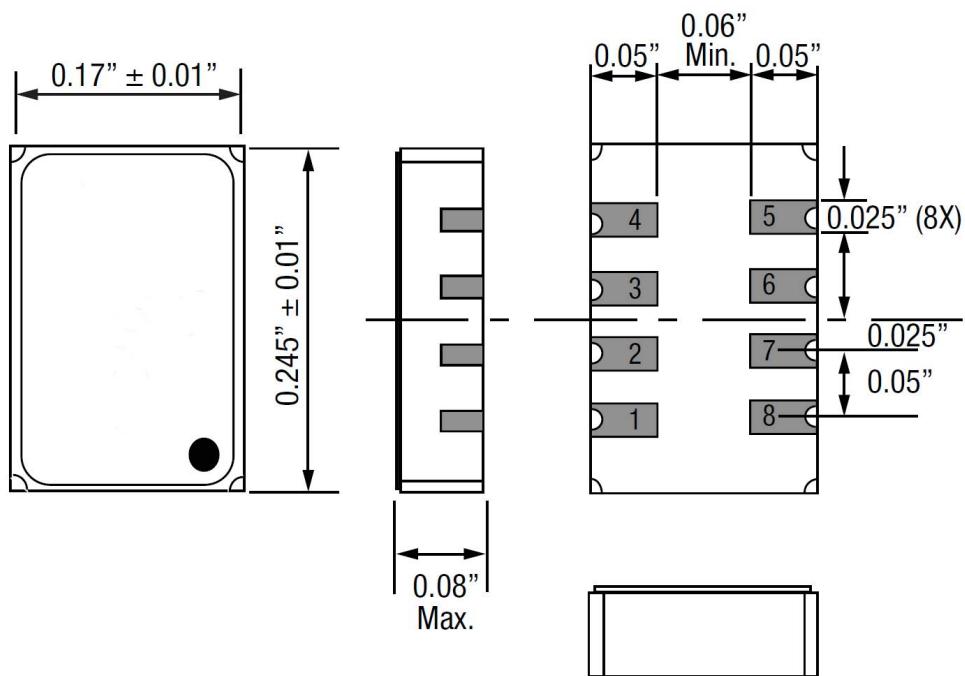


Figure 8. Package Dimensions, 4-Lead LCC



**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 $\mu$ in Au over min 80 $\mu$ in Ni	Min 60 $\mu$ in Au over min 80 $\mu$ in Ni
Lead thickness	N/A	N/A
Hermetic	Yes	Yes
CAGE code OJGG3		

## Ordering Information

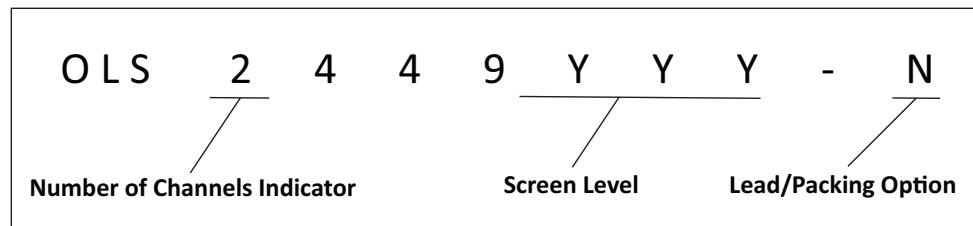
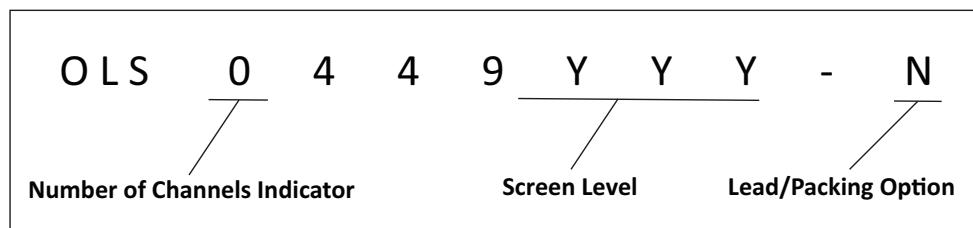


Table 4. Related Parts

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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