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 °C to +125 °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.

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.

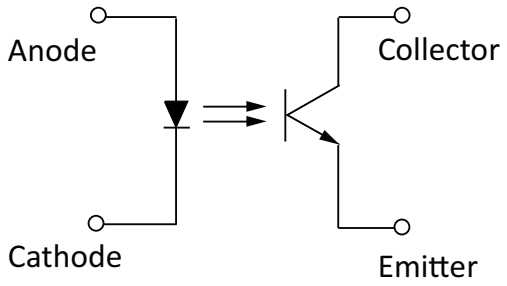
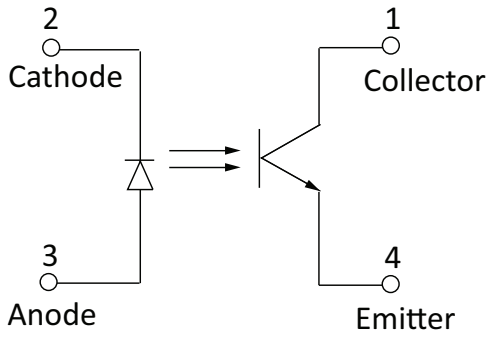


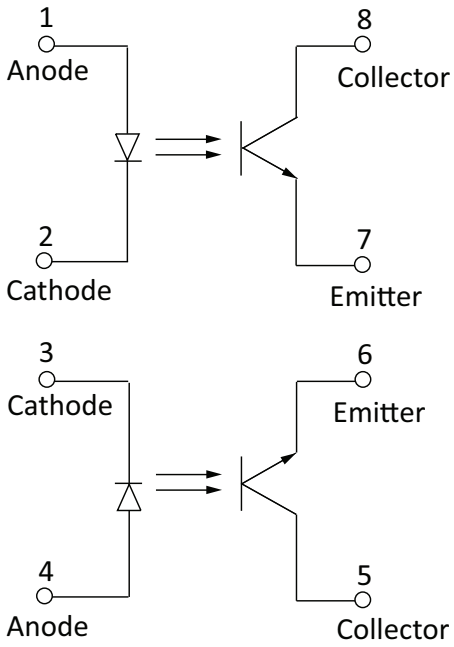
Figure 1. Functional Block Diagram

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.



Hermetic 4-Lead LCC (OLS0449YYY-N)



Hermetic 8-Lead LCC (OLS2449YYY-N)

Figure 2. Pinouts

Electrical and Mechanical Specifications

Table 1. Absolute Maximum Ratings[1]
(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	$\Delta P_O/\Delta T_A$	$T_A \geq 25$ °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 Channel[1]

(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

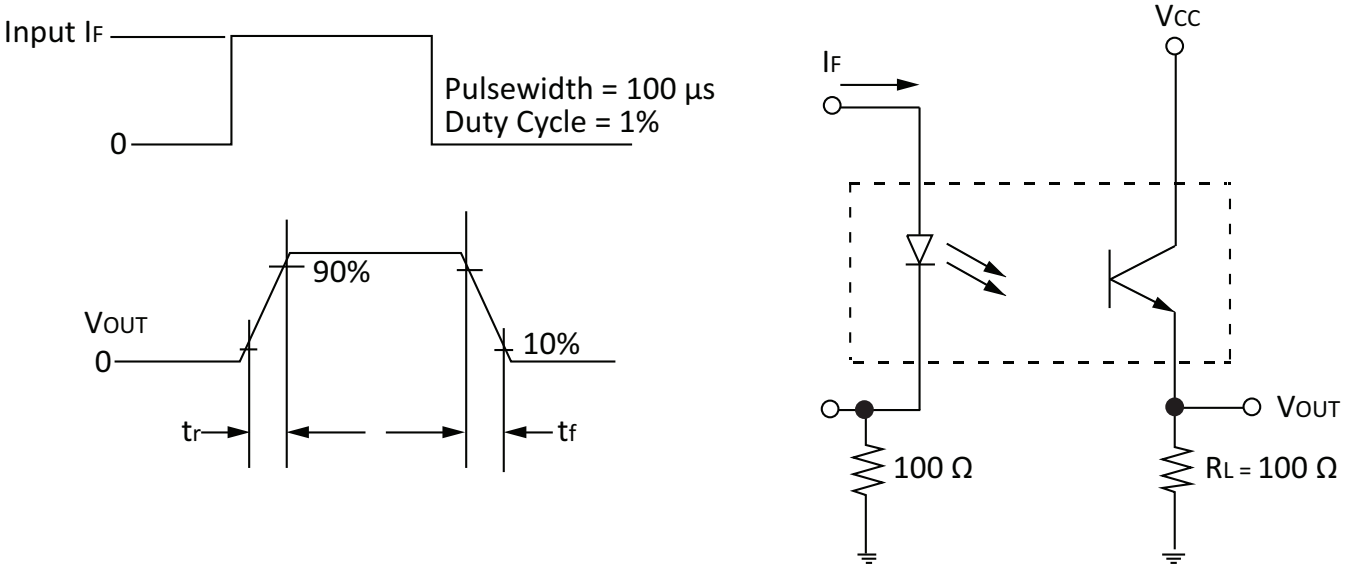


Figure 3. Switching Test Circuit

Typical Performance Characteristics (T_A = 25 °C, Unless Otherwise Indicated)

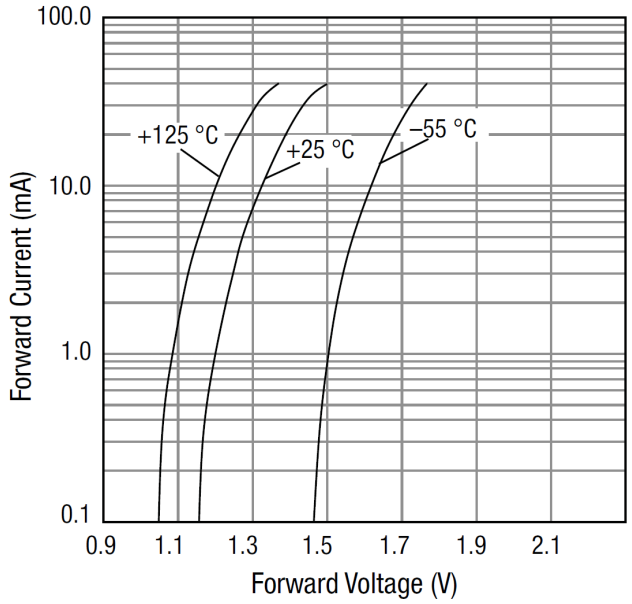


Figure 4. Forward Current vs Diode Forward Voltage

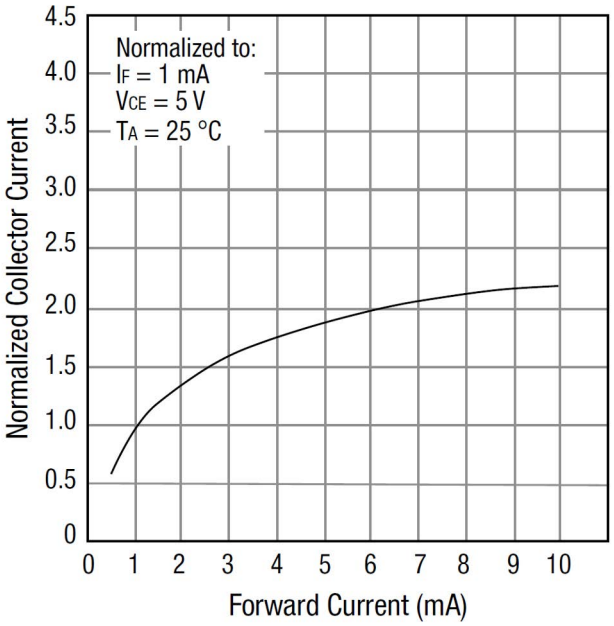


Figure 5. Normalized Collector Current vs Forward Current

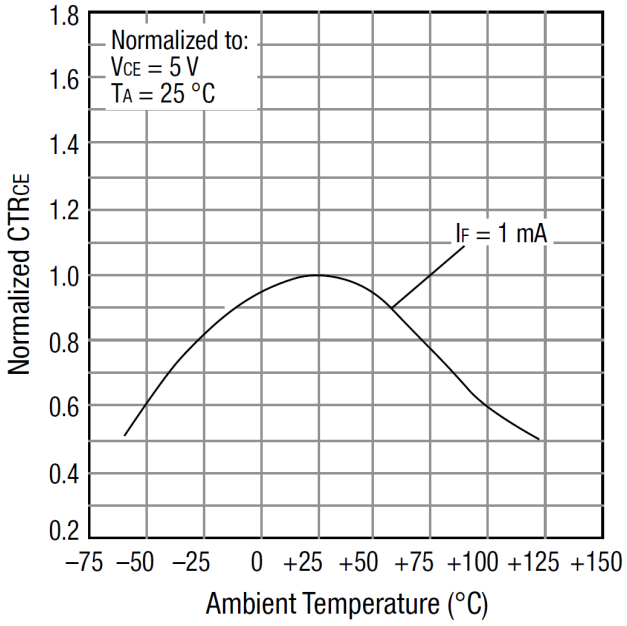


Figure 6. Normalized CTR vs Temperature

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.

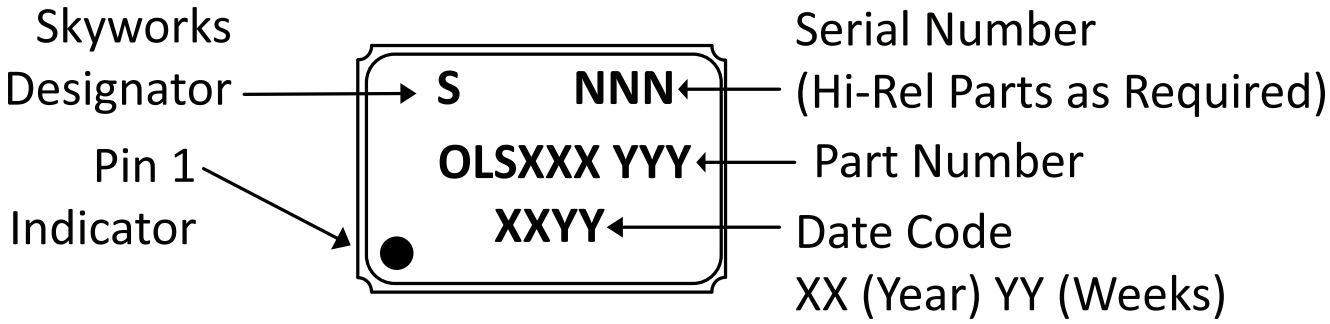


Figure 7. Typical Part Marking, 4-Lead LCC

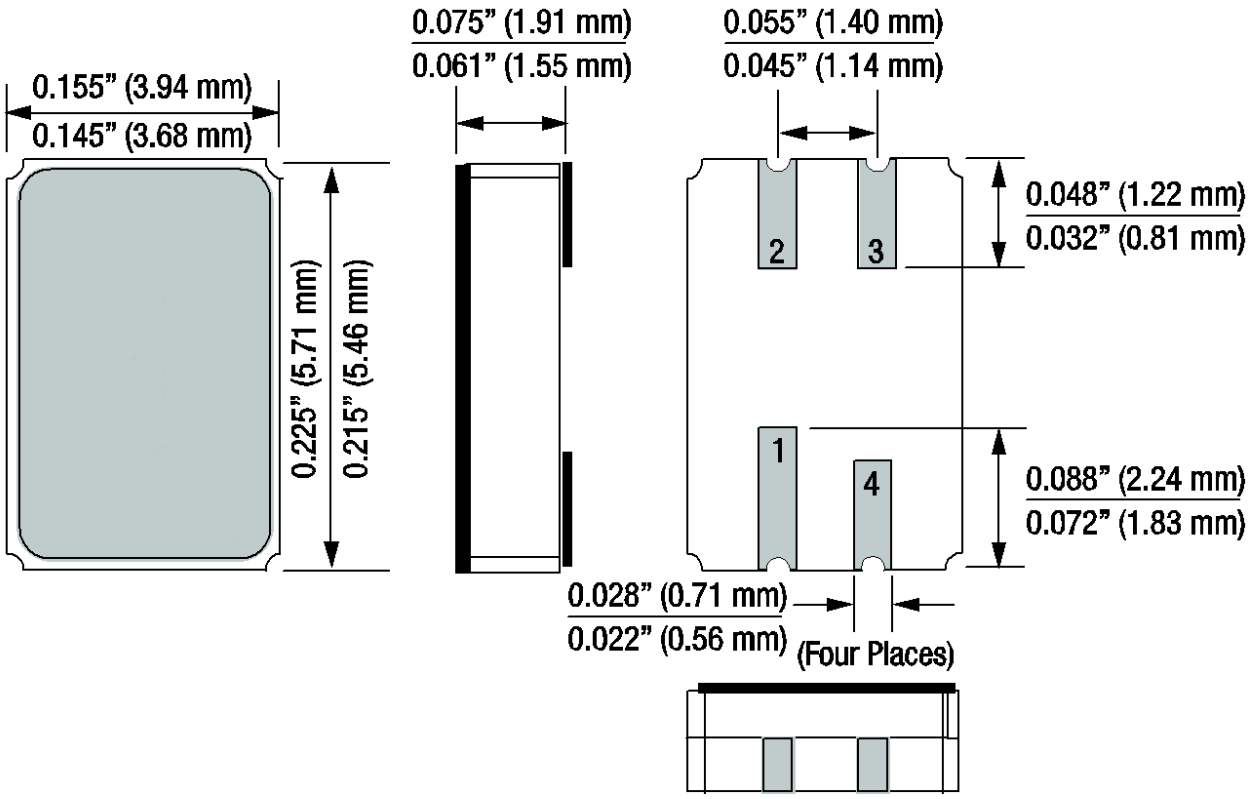


Figure 8. Package Dimensions, 4-Lead LCC

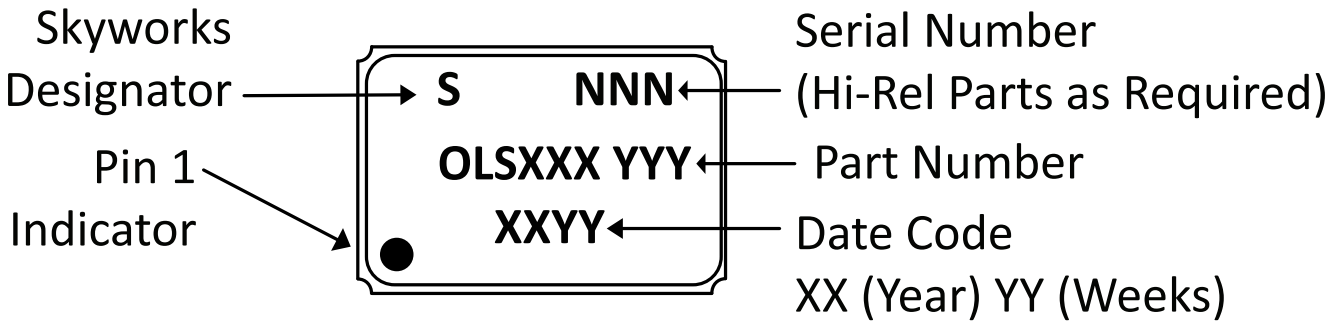


Figure 9. Typical Part Marking, 8-Lead LCC

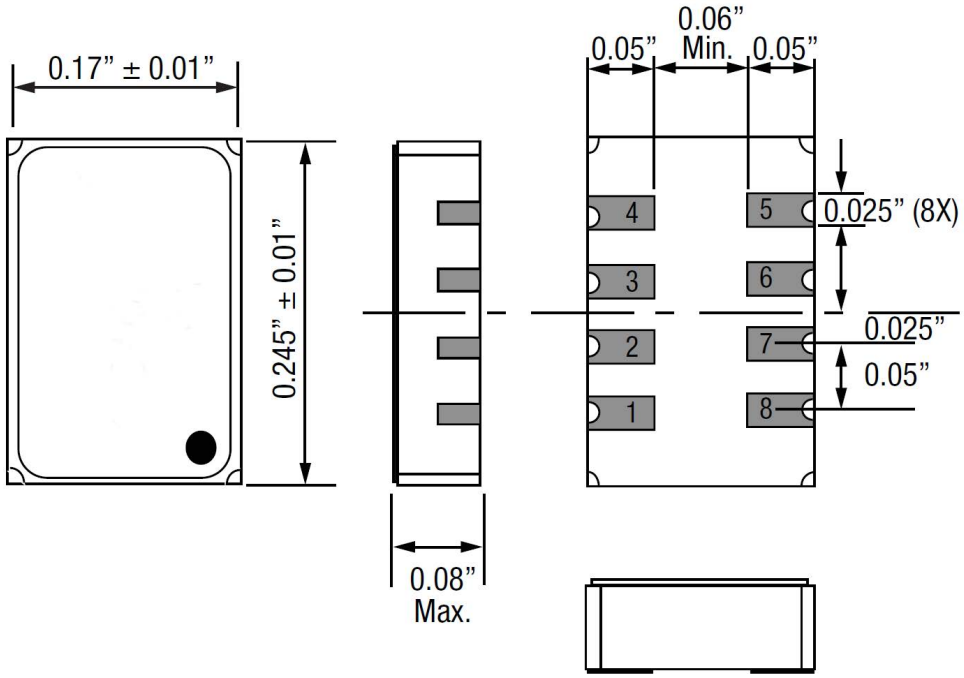
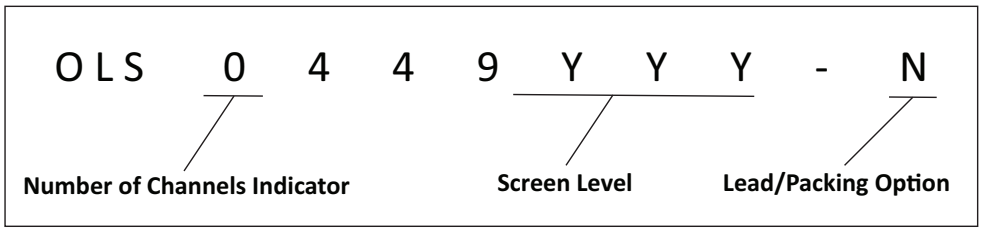


Figure 10. Package Dimensions, 8-Lead LCC

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



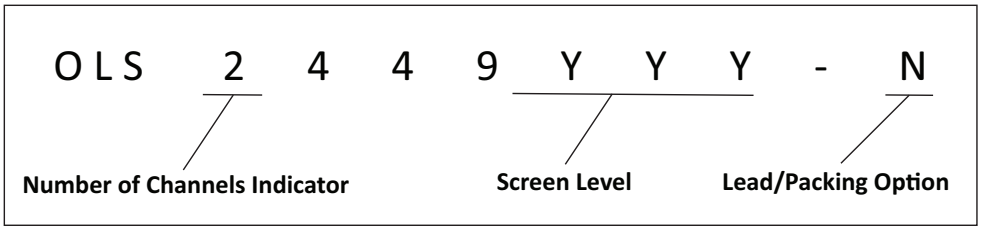


Table 4. Related Parts

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