DATA SHEET

OLS449, OLC449, OLF449, OLH449: Radiation-Tolerant, Transistor Output Optocoupler with Base Connection

Applications

- Aerospace
- Defense
- Industrial
- Commercial

Features

- High voltage electrical isolation
- High CTR assured over –55° to +125 °C
- Low input current: 1 mA
- Comparable to OLx249 family, but featuring higher CTR
- CMOS to LSTTL or TTL compatibility
- Various packages available to fit application
  - Small footprint, hermetic packages (LCC, FP, TO-5)
  - Cost-effective package (Glob Top SMT)
- 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 OLx449 is designed for low input current applications that require optical isolation with a high CTR and low saturation VCE. Each optocoupler consists of an LED and NPN silicon phototransistor that is electrically isolated, but optically coupled inside a hermetic (LCC, FP, TO-5) or non-hermetic (Glob Top) package.

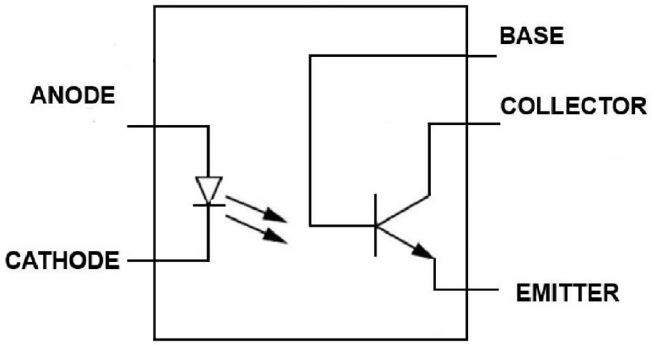
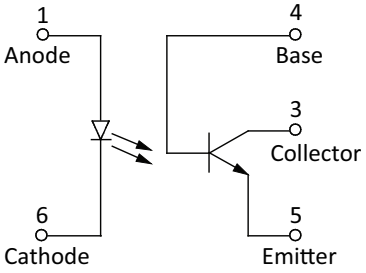


Figure 1. Block Diagram

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

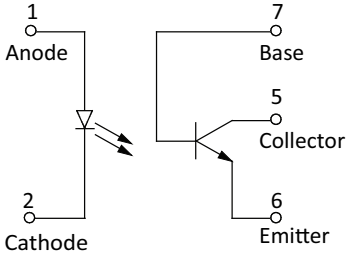
OLx449 devices are offered as unscreened versions as well as screened to customer requirements, including MIL-STD-883 Class B equivalent, MIL-PRF-19500 JAN, JANTX, JANTXV, JANS equivalent and MIL-PRF-38534 Class H, K equivalent.

Hermetic 6-Lead LCC (OLS449YYY-N)



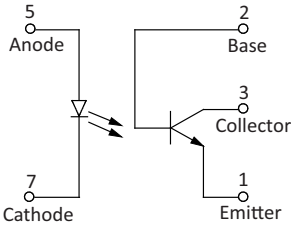
2: N/C

Hermetic 8-Lead Flatpack (OLF449YYY-N)



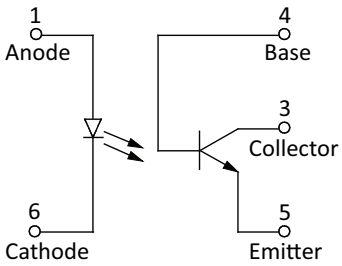
Pins 3, 8: N/C
Pin 4: Electrically connected to seal ring

Hermetic 6-Lead TO-5 (OLH449YYY-N)



Pin 6: N/C
Pin 3: Connected to case.

Non-Hermetic 6-Lead Glob Top SMT (OLC449YYY-N)



Pin 2: N/C

Figure 2. Pinouts

Electrical and Mechanical Specifications

Table 1. OLx449 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
Average forward current derating	$\Delta I_F/\Delta T_A$	$T_A \geq 65$ °C		0.67	mA/°C
Peak forward current	I_F	Pulsewidth ≤ 1 uS, 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 base voltage	V_{EBO}			7	V
Collector to base voltage	V_{CBO}			65	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, OLS449	–1500	1500	V
		T_A = 25 °C, duration = 1 s, OLC449/ OLF449/OLH449	–1000	1000	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. OLS449/OLC449: Measured between pins 1, 2, and 6 shorted together, and pins 3, 4, and 5 shorted together.
   OLF449: Measured between pins 1, 2, 3, and 4 shorted together, and pins 5, 6, 7, and 8 shorted together.
   OLH449: Measured between pins 5, 6, and 7 shorted together, and pins 1, 2, and 3 shorted together.

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

Table 2. OLx449 Electrical Specifications[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 emitter breakdown voltage	BV_{CEO}	I_{CE} = 1 mA	65			V
Collector base breakdown voltage	BV_{CBO}	I_{CB} = 100 µA	65			V
Emitter base breakdown voltage	BV_{EBO}	I_{EB} = 100 µA	7			V
Collector 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	µA
Collector base dark current	I_{CB_OFF}	I_F = 0 mA, V_{CB} = 20 V			10	nA
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 base current	I_{CB_ON}	I_F = 10 mA, V_{CB} = 5 V	300			µA
Collector emitter saturation voltage	V_{CE_SAT}	I_F = 1 mA, I_C = 5 mA			0.3	V
Output resistance[2]	R_{I-O}	OLS449, V_{I-O} = ±1500 VDC		10^{11}		Ω
		OLC449/OLF449/OLH449, V_{I-O} = ±1000 VDC				
Output capacitance[2]	C_{I-O}	V_{I-O} = 0 V, f = 1 MHz			5	pF
Switching Characteristics						
Rise time	t_r	Vcc = 10 V, I_F = 5 mA, R_L = 100 Ω			25	µs
Fall time	t_f				25	µs

1. Performance is assured only under the conditions listed in the above table. Catalog OLx449 is 100% tested at 25 °C only.
2. OLS449/OLC449: Measured between pins 1, 2, and 6 shorted together, and pins 3, 4, and 5 shorted together.
   OLF449: Measured between pins 1, 2, 3, and 4 shorted together, and pins 5, 6, 7, and 8 shorted together.
   OLH449: Measured between pins 5, 6, and 7 shorted together, and pins 1, 2, and 3 shorted together.
   T_A = 25 °C and duration = 1 s.

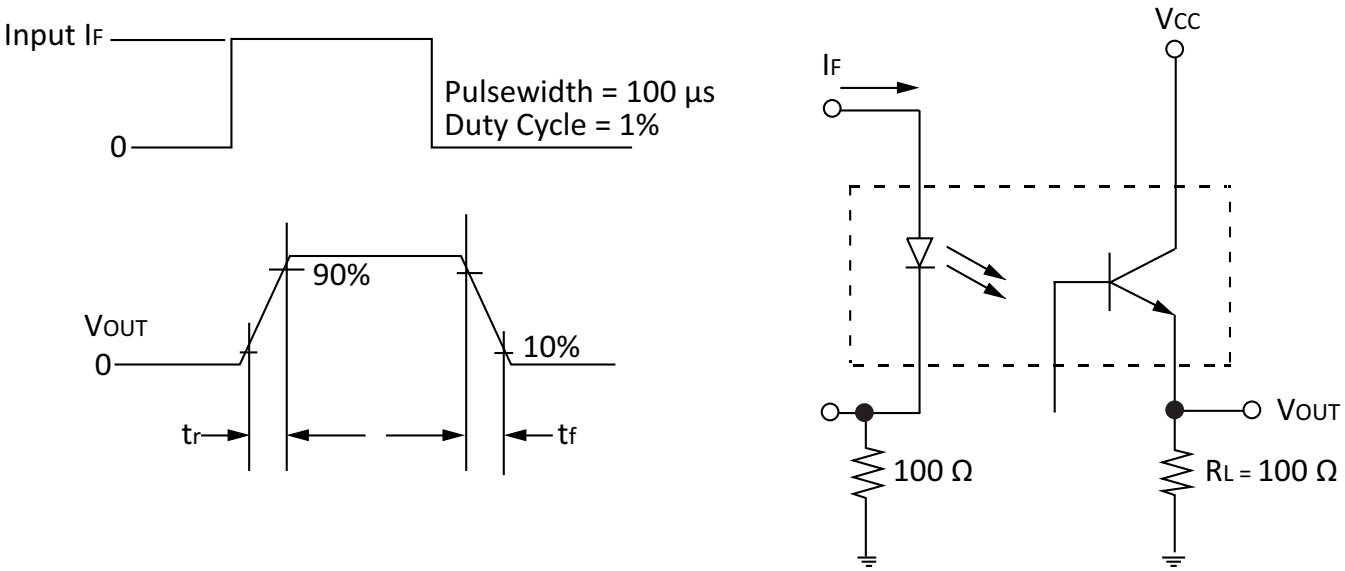


Figure 3. Switching Test Circuit

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

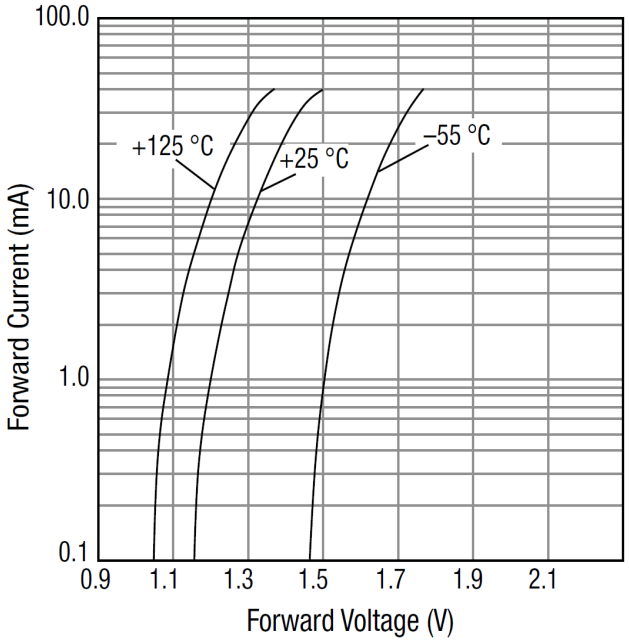


Figure 4. Forward Current vs Diode Forward Voltage

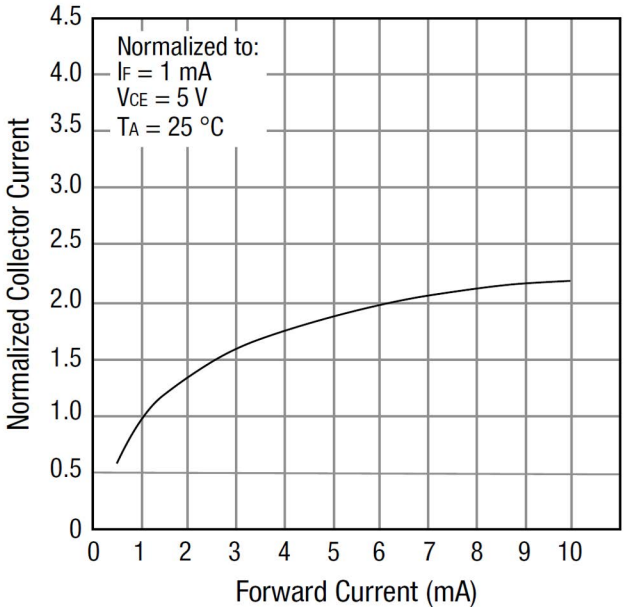


Figure 5. Normalized Collector Current vs Forward Current

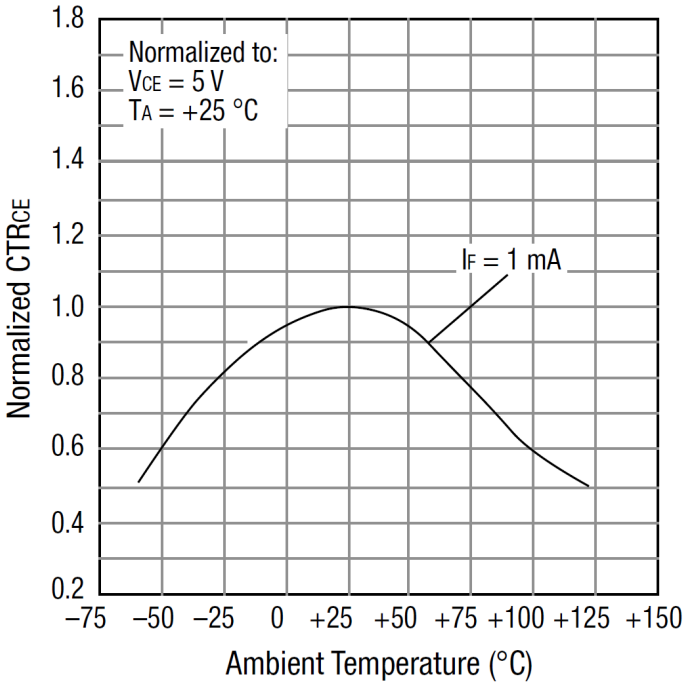


Figure 6. Normalized CTR vs Temperature

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.

The OLC449 is rated to Moisture Sensitivity Level 3 (MSL3) at 260 °C (Not applicable for hermetic devices.) For additional information, refer to the Skyworks Application Note, Solder Reflow Information, document number 200164.

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

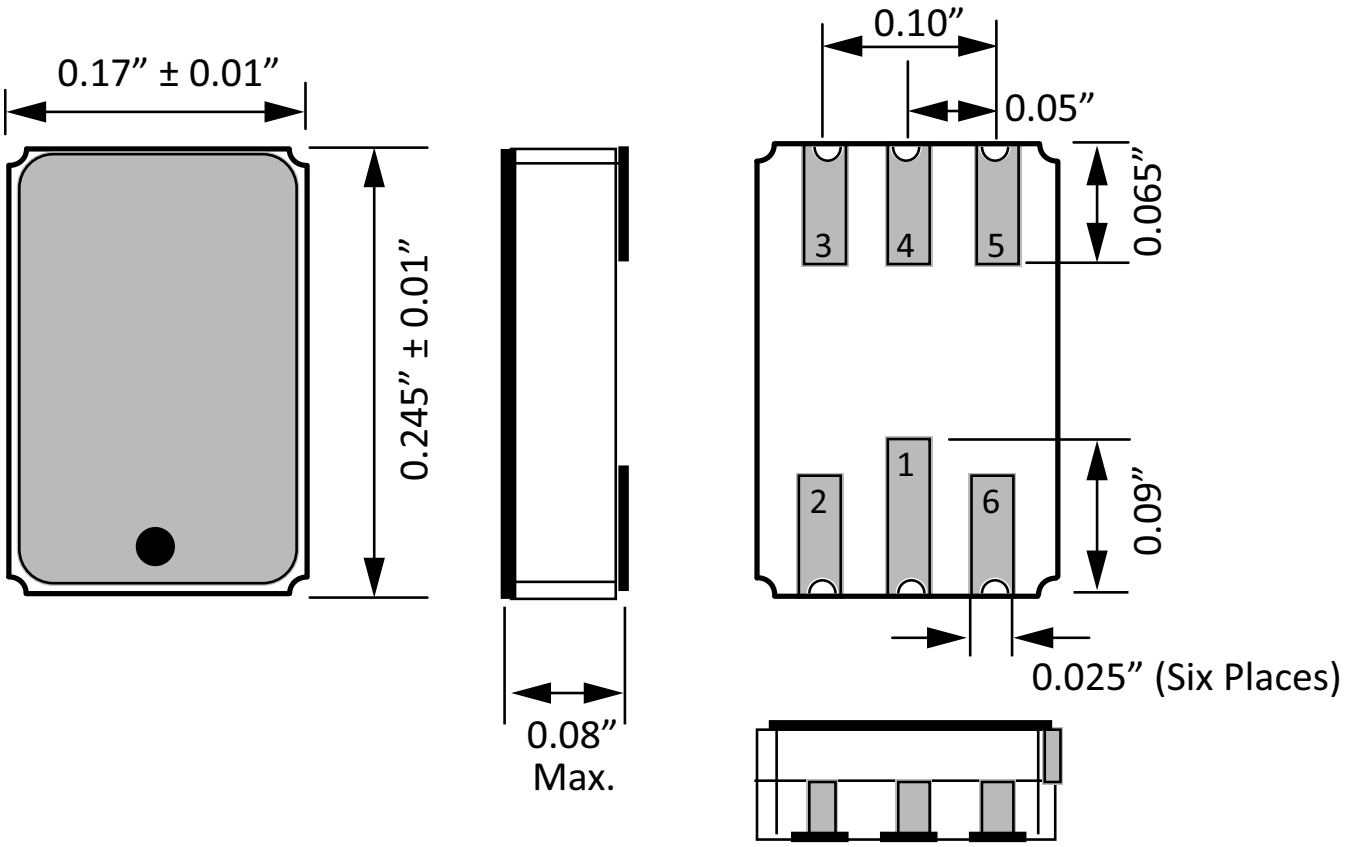


Figure 7. Package Dimensions, 6-Lead LCC

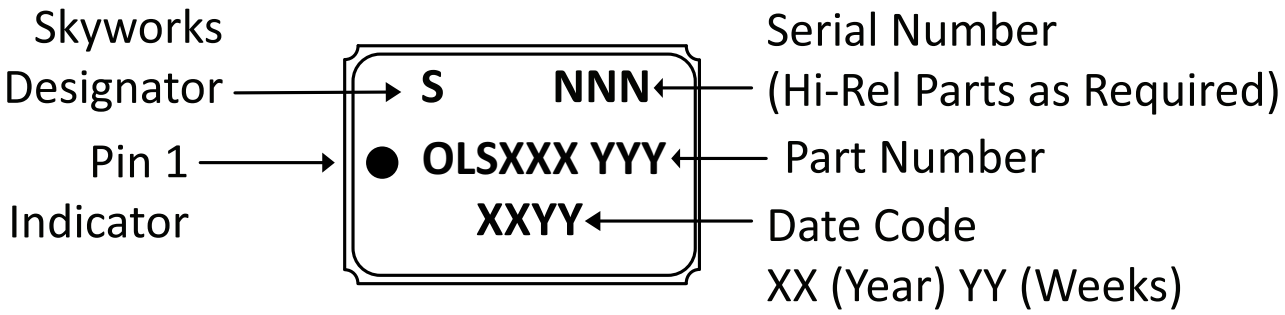


Figure 8. Part Marking, 6-Lead LCC

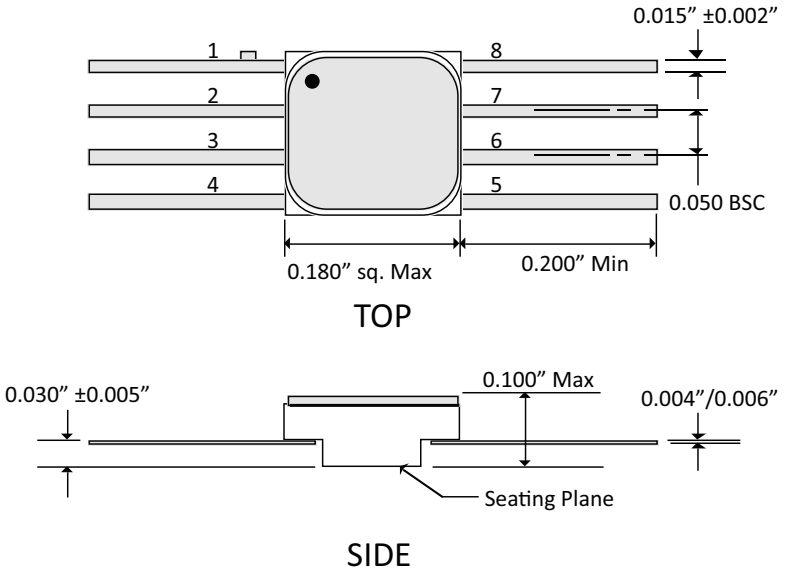


Figure 9. Package Dimensions, 8-Lead Flatpack

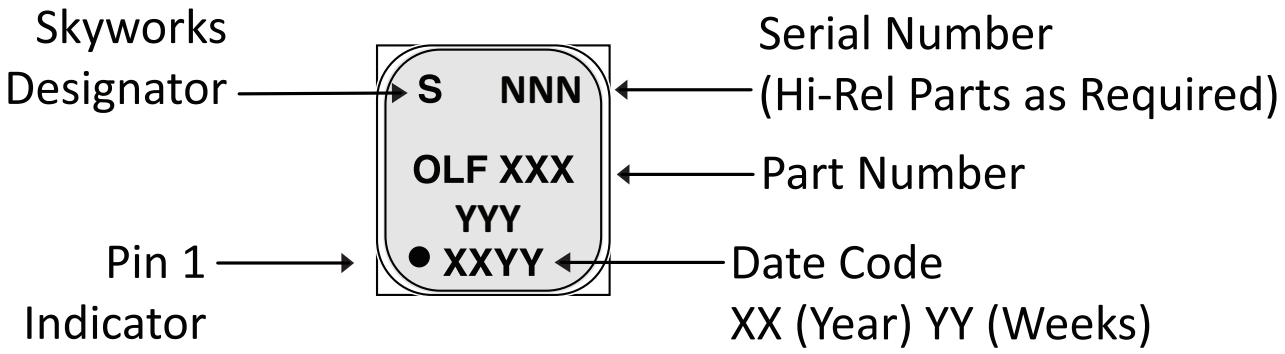


Figure 10. Part Marking, 8-Lead Flatpack

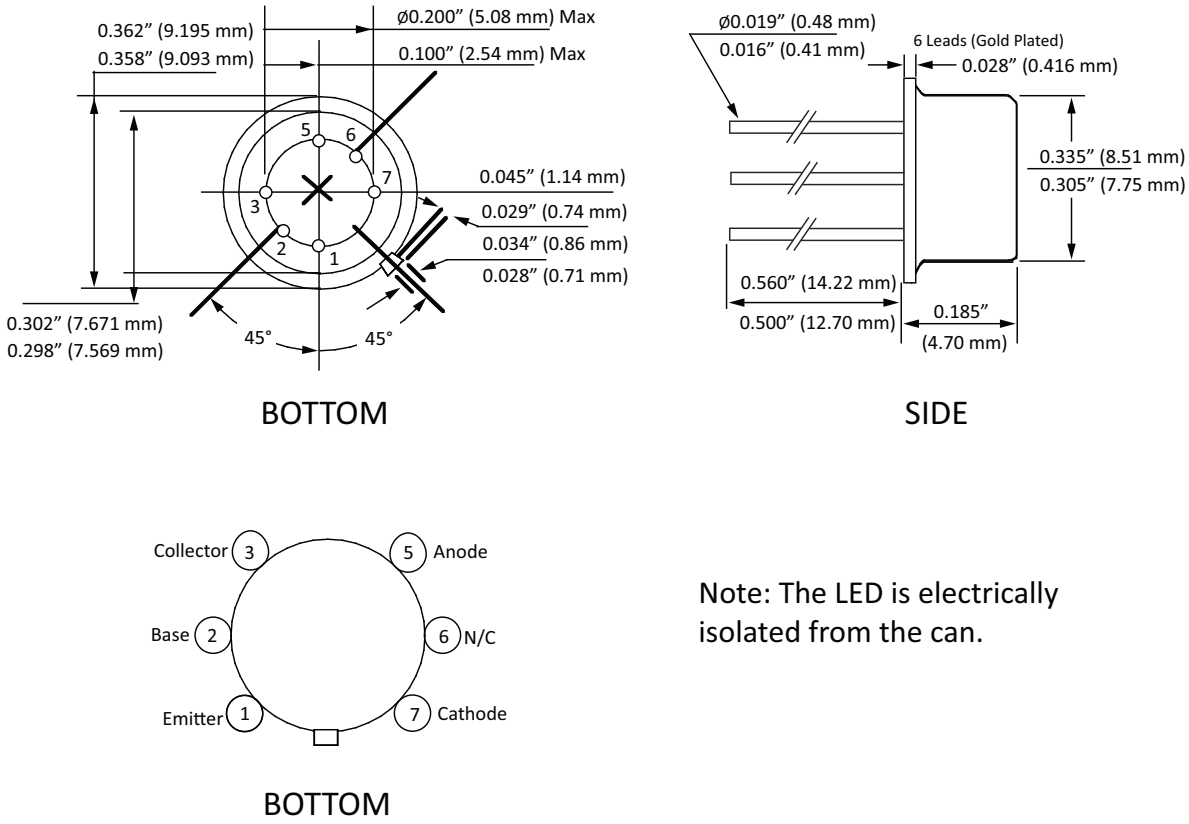


Figure 11. Package Dimensions, 6-Lead TO-5

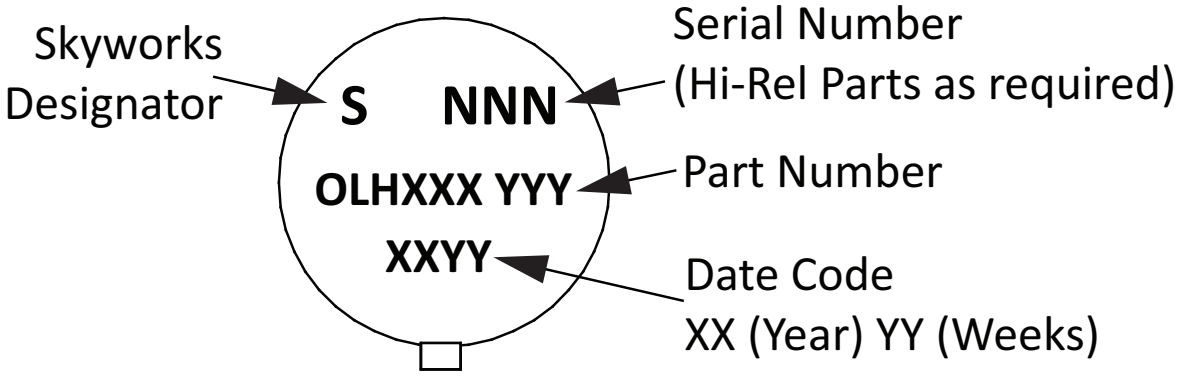


Figure 12. Part Marking, 6-Lead TO-5

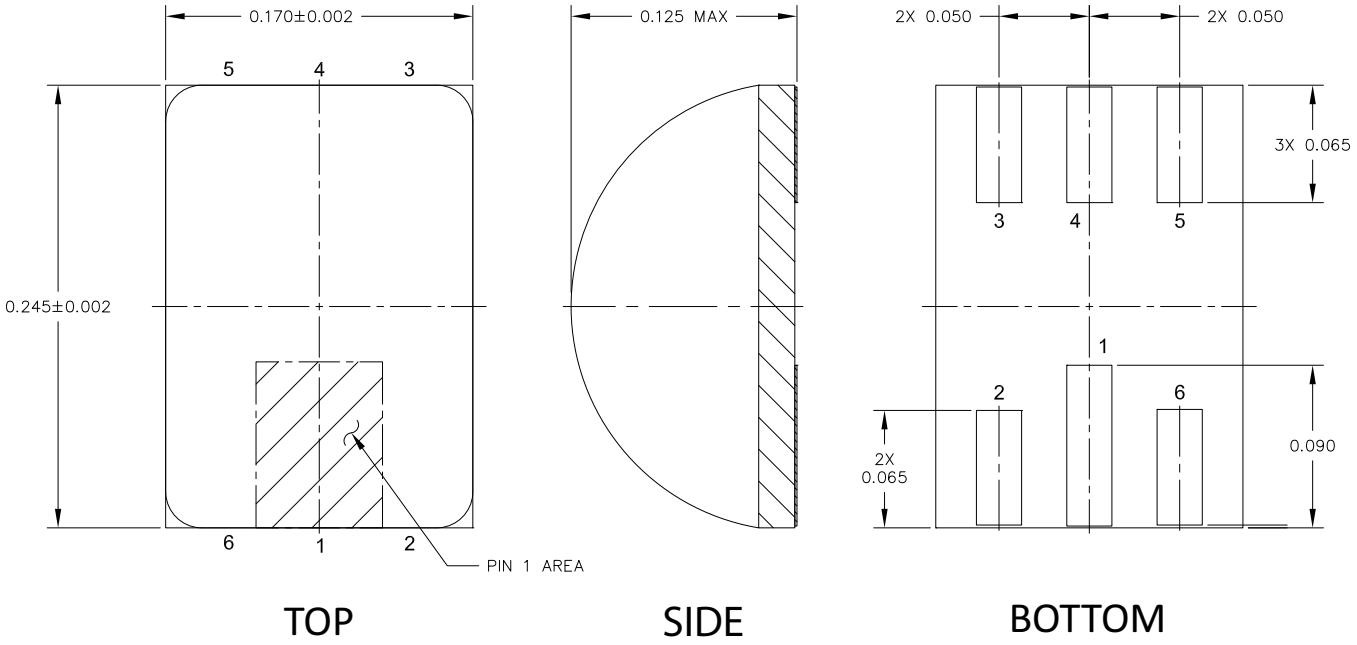


Figure 13. Package Dimensions, 6-Lead Glob Top SMT

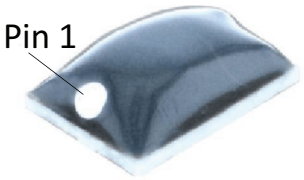


Figure 14. Part Marking, 6-Lead Glob Top SMT

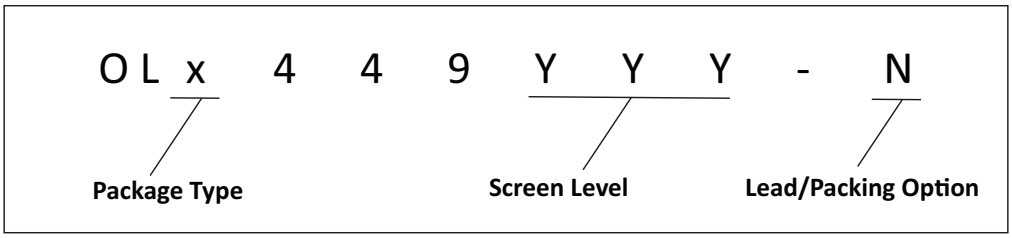
Table 3. Additional Package Information

Lead Style	6-Lead LCC (OLS449YYY-N)	8-Lead Flatpack (OLF449YYY-N)	6-Lead TO-5 (OLH449YYY-N)	6-Lead Glob Top SMT (OLC449YYY-N)
	Surface mount	Surface mount	Through hole	Surface mount
Lead finish/plating	Min 60 µin Au over min 80 µin Ni	Min 60 µin Au over min 80 µin Ni	Min 50 µin Au over min 50 µin Ni	Min 2 µin Au over min 2 µin Pd and min 100 µin Ni
Lead thickness	N/A	5 mils	16 mils	N/A
Hermetic	Yes	Yes	Yes	No
CAGE code OJGG3				

Table 4. Related Parts

Part Number	Package	Description	Comments
OLS049	4-lead LCC	Radiation tolerant phototransistor, hermetic surface mount optocoupler	High CTR assured over –55 °C to 125 °C, 1000 VDC isolation voltage
OLC049	4-lead Glob Top	Radiation tolerant phototransistor, surface mount optocoupler	High CTR assured over –55 °C to 125 °C, 1000 VDC isolation voltage
OLS249	6-lead LCC	Radiation tolerant phototransistor, hermetic surface mount optocoupler with base connection	1500 VDC isolation voltage

Ordering Information



	Hermetic 6-Lead LCC	Hermetic 8-Lead Flatpack	Hermetic 6-Lead TO-5	Non-Hermetic 6-Lead Glob Top SMT
Catalog	OLS449	OLF449	OLH449	OLC449
MIL-STD-883 Class B equivalent	OLS449SB	OLF449SB	OLH449SB	N/A
JANTX equivalent	OLS449SX	OLF449SX	OLH449SX	N/A
JANTXV equivalent	OLS449SXV	OLF449SXV	OLH449SXV	N/A
JANS equivalent	OLS449PS	OLF449PS	OLH449PS	N/A
Non-solder dipped and standard packing	Blank	Blank	Blank	Blank
Solder dipped	-1	-1	-1	N/A
Tape and reel	-2	N/A	N/A	N/A
Solder dip and tape and reel	-3	N/A	N/A	N/A
Standard packing	Tubes	Individual ESD carriers	Conductive carriers	Gel pack