

## DATA SHEET

# OLS300: Hermetic Surface-Mount High-Speed Optocoupler

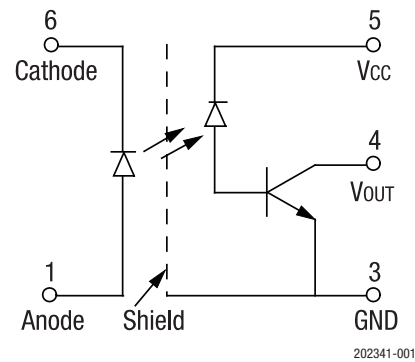
## Features

- Electrical parameters guaranteed over  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  ambient temperature range
- 1500 V<sub>DC</sub> electrical isolation
- High-speed, 1 Mbps typical
- Open collector output
- High reliability and rugged construction
- Similar to 6N135/136, 4N55 type optocouplers
- Radiation tolerant
- High-reliability screenings are available

## Description

The OLS300 is suitable for interfacing Transistor-to-Transistor Logic (TTL) to Low Power Schottky Transistor-Transistor Logic (LSTTL), TTL, or Complementary Metal Oxide Semiconductors (CMOSs), as well as wide bandwidth analog applications. Each OLS300 has an LED and integrated photo-diode transistor detector mounted and coupled in a custom hermetic surface mount LCC ceramic package, that provides 1500 V<sub>DC</sub> of electrical isolation between the input and output. The integrated photo-diode transistor improves the switching speed by orders of magnitude as compared to standard photo-transistors by reducing the base- to-collector capacitance.

The OLS300's device mounting is achieved with reflow soldering or conductive epoxies.



**Figure 1. OLS300 Block Diagram**

Figure 1 shows the OLS300 functional block diagram. Table 1 provides the OLS300 absolute maximum ratings. Table 2 provides the OLS300 electrical specifications.

Figures 2 through 4 illustrate the OLS300 typical performance characteristics. Figure 5 shows the OLS300 switching test circuit. Figure 6 provides the OLS300 package dimensions.

**Table 1. OLS300 Absolute Maximum Ratings<sup>1</sup>**

| Parameter                                      | Symbol           | Minimum | Maximum | Units |
|------------------------------------------------|------------------|---------|---------|-------|
| <b>Coupled</b>                                 |                  |         |         |       |
| Input to output isolation voltage <sup>2</sup> | V <sub>DC</sub>  | −1500   | +1500   | V     |
| Storage temperature range                      | T <sub>STG</sub> | −65     | +150    | °C    |
| Operating temperature range                    | T <sub>A</sub>   | −55     | +125    | °C    |
| Mounting temperature range (3 minutes maximum) |                  |         | +240    | °C    |
| <b>Input Diode</b>                             |                  |         |         |       |
| Average input current                          | I <sub>DD</sub>  |         | 20      | mA    |
| Peak forward current (≤1 ms duration)          | I <sub>F</sub>   |         | 40      | mA    |
| Reverse voltage                                | V <sub>R</sub>   |         | 5       | V     |
| Power dissipation                              | P <sub>D</sub>   |         | 36      | mW    |
| <b>Output Detector</b>                         |                  |         |         |       |
| Average output current                         |                  |         | 8       | mA    |
| Peak output current                            |                  |         | 16      | mA    |
| Supply voltage                                 | V <sub>CC</sub>  | −0.5    | +18.0   | V     |
| Output voltage                                 | V <sub>OUT</sub> | −0.5    | +18.0   | V     |
| Power dissipation                              | P <sub>D</sub>   |         | 50      | mW    |
| Derate linearly from 100 °C                    |                  |         | 1.4     | mW/°C |

<sup>1</sup> Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to 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.

<sup>2</sup> Measured between pins 1, 2, and 6 shorted together, and pins 3, 4, and 5 shorted together. T<sub>A</sub> = 25 °C and duration = 1 s.

**ESD HANDLING:** 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 when handling or transporting. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD handling precautions should be used at all times.

**Table 2. OLS300 Electrical Specifications<sup>1</sup>**  
**(T<sub>A</sub> = 55 °C to + 125 °C, Unless Otherwise Noted)**

| Parameter                           | Symbol            | Test Condition                                                                         | Minimum | Typical | Maximum | Units |
|-------------------------------------|-------------------|----------------------------------------------------------------------------------------|---------|---------|---------|-------|
| Current transfer ratio <sup>2</sup> | CTR               | I <sub>F</sub> = 10.0 mA, V <sub>O</sub> = 0.4 V, V <sub>CC</sub> = 4.5 V              | 20.0    | 45.0    |         | %     |
| Logic:                              |                   |                                                                                        |         |         |         |       |
| Low output voltage                  | V <sub>OL</sub>   | I <sub>F</sub> = 10.0 mA, I <sub>OL</sub> = 1.5 mA, V <sub>CC</sub> = 4.5 V            |         | 0.15    | 0.4     | V     |
| High output current                 | I <sub>OH</sub>   | I <sub>F</sub> = 0 mA, V <sub>O</sub> = V <sub>CC</sub> = 15.0 V                       |         | 0.05    | 100.00  | μA    |
| Low supply current                  | I <sub>CC</sub>   | I <sub>F</sub> = 10 mA, V <sub>CC</sub> = 15 V, V <sub>O</sub> = open                  |         | 40      | 200     | μA    |
| High supply current                 | I <sub>CC</sub> H | I <sub>F</sub> = 0 mA, V <sub>CC</sub> = 15.0 V, V <sub>O</sub> = open                 |         | 0.05    | 10.0    | μA    |
| Input:                              |                   |                                                                                        |         |         |         |       |
| Forward voltage                     | V <sub>F</sub>    | I <sub>F</sub> = 10.0 mA                                                               |         | 1.7     | 2.5     | V     |
| Reverse breakdown voltage           | BV <sub>R</sub>   | I <sub>R</sub> = 10 μA                                                                 | 3       |         |         | V     |
| Output leakage current <sup>3</sup> | I <sub>L0</sub>   | R <sub>H</sub> ≤ 50%, T <sub>A</sub> = 25 °C, V <sub>L0</sub> = 1500.0 V <sub>DC</sub> |         |         | 1.0     | μA    |
| Propagation delay time:             |                   |                                                                                        |         |         |         |       |
| Logic high to low                   | t <sub>PHL</sub>  | I <sub>F</sub> = 10 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 4.1 kΩ                 |         | 0.3     | 1.0     | μs    |
| Logic low to high                   | t <sub>PLH</sub>  | I <sub>F</sub> = 10 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 4.1 kΩ                 |         | 0.5     | 2.0     | μs    |

<sup>1</sup> Performance is guaranteed only under the conditions listed in the above table.

<sup>2</sup> CTR is defined as the ratio of the output collector current I<sub>C</sub> to the forward LED current I<sub>F</sub>, multiplied by 100%.

<sup>3</sup> Measured between pins 1, 2, and 6 shorted together, and pins 3, 4, and 5 shorted together. T<sub>A</sub> = 25 °C and duration = 1 s.

Typical Performance Characteristics

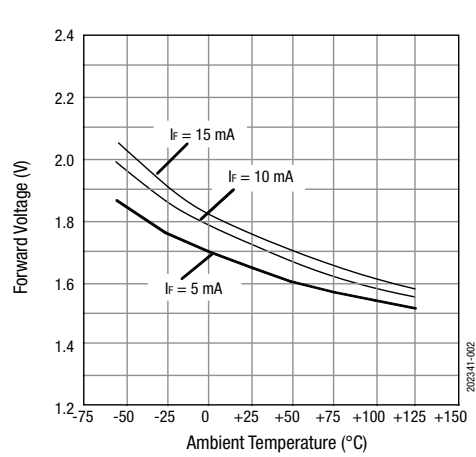


Figure 2. LED Forward Voltage vs Temperature

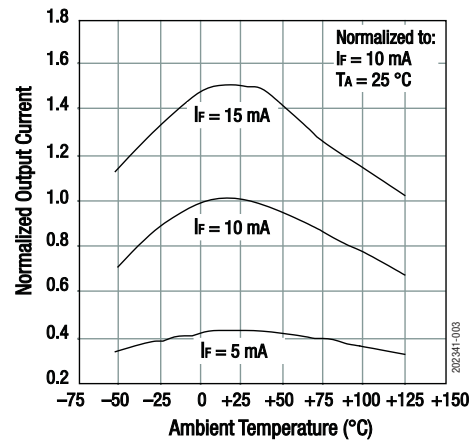


Figure 3. Normalized Output Current vs Temperature

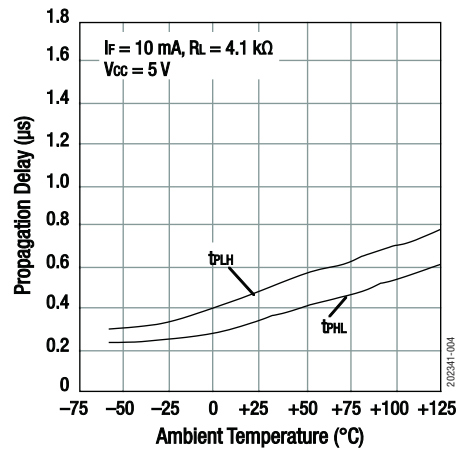


Figure 4. Propagation Delay vs Temperature

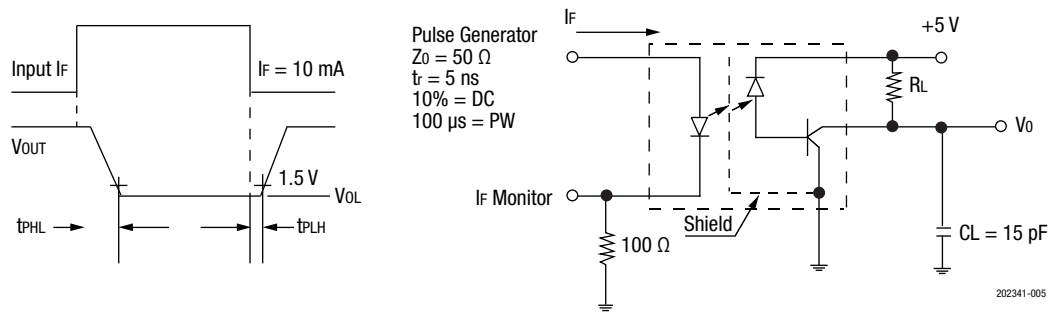


Figure 5. OLS300 Switching Test Circuit

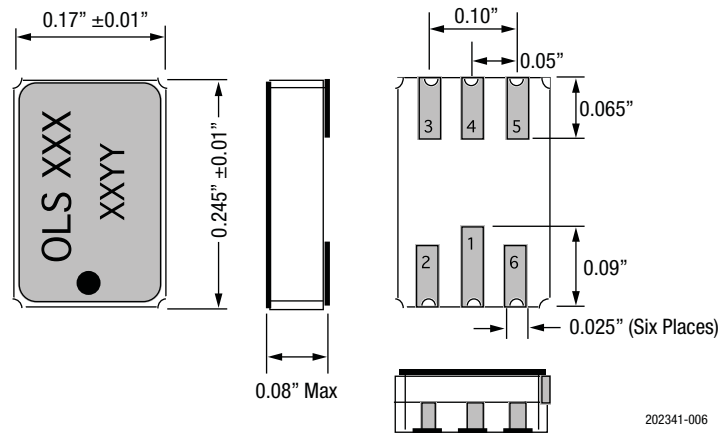


Figure 6. OLS300 Package Dimensions

## Ordering Information

| Model Name                                            | Manufacturing Part Number |
|-------------------------------------------------------|---------------------------|
| OLS300: Hermetic Surface-Mount High-Speed Optocoupler | OLS300                    |

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