DATA SHEET

OLS400: Hermetic Surface-Mount Low-Input Current Optocoupler

Features

- Electrical parameters guaranteed over –55 °C to +125 °C ambient temperature range
- 1500 V_{DC} electrical isolation
- Low input current: 0.5 mA
- Low output V_{SAT}: 0.1 V typical
- High current transfer ratio (CTR): 1000% typical
- Low power consumption
- Similar to industry standard parts: 6N138/6N139 in plastic and 6N140 in hermetic dual inline packages (DIPs)
- Offers 100% high reliability screenings

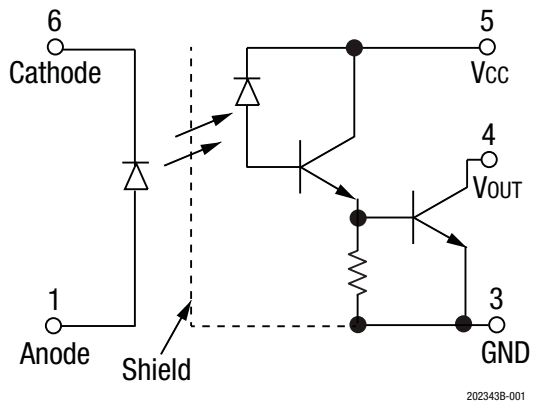

Figure 1. OLS400 Block Diagram

Description

The OLS400 has a high CTR at low input currents, making it ideal for applications such as Metal Oxide Semiconductors (MOS), Complementary MOSs (CMOS), and low-power logic interfacing or RS-232C data transmission systems. Each OLS400 has an LED and integrated photodiode Darlington detector I/C, mounted and coupled in a custom hermetic surface-mount Leadless Chip Carrier (LCC) package that provides 1500 V_{DC} electrical isolation between the input and output.

The Darlington detector has an integrated base-to-emitter resistor for superior high-temperature performance. The split Darlington design permits lower output saturation voltage and higher switching speed operation than is possible with conventional photo-Darlington designs.

Device mounting is achieved with reflow soldering or conductive epoxies. The pads are gold plated and RoHS compliant.

Figure 1 shows the OLS400 functional block diagram. Table 1 provides the OLS400 absolute maximum ratings. Table 2 provides the OLS400 electrical specifications.

Figures 2 through 5 illustrate the OLS400 typical performance characteristics. Figure 6 shows the OLS400 switching test circuit. Figure 7 provides the OLS400 package dimensions.

Table 1. OLS400 Absolute Maximum Ratings[1]

Parameter	Symbol	Minimum	Maximum	Units
Coupled				
Input to output isolation voltage	V_{OC}	–1500	+1500	V
Storage temperature	T_{STG}	–65	+150	°C
Operating temperature	T_A	–55	+125	°C
Mounting temperature range (3 minutes maximum)			+240	°C
Input Diode				
Average input current	I_{DD}		20	mA
Peak forward current (≤ 1 ms duration}	I_F		40	mA
Reverse voltage	V_R		5	V
Power dissipation	Po		36	mW
Output Detector				
Average output current			+40	mA
Supply voltage	V_{CC}	–0.5	+20.0	V
Output voltage	V_{OUT}	–0.5	+20.0	V
Power dissipation	Po		+50	mW

[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] Measured between pins 1, 2, and 6 shorted together, and pins 3, 4, and 5 shorted together. TA = 25°C and duration = 1 s.

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

Table 2. OLS400 Electrical Specifications (Note 1)
(T_A = 25 °C, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Minimum	Typical	Maximum	Units
Current transfer ratio[2]	CTR	I_F = 0.5 mA, VO = 0.4 V, VCC = 4.5 V	300			%
		I_F = 1.6 mA, VO = 0.4 V, VCC = 4.5 V	300			%
		I_F = 5.0 mA, VO = 0.4 V, VCC = 4.5 V	200			%
Logic:						
Low output voltage	V_{OL}	I_F = 0.5 mA, I_{OL} = 1.5 mA, V_{CC} = 4.5 V		0.1	0.4	V
		I_F = 5.0 mA, I_{OL} = 10.0 mA, V_{CC} = 4.5 V		0.2	0.4	V
High output current	I_{OH}	I_F = 0 mA, V_O = V_{CC} = 18.0 V		0.005	250.00	µA
Low supply current	I_{CCL}	I_F = 1.6 mA, V_{CC} = 18 V		0.6	2.0	mA
High supply current	I_{CCH}	I_F = 0 mA, V_{CC} = 18.0 V		0.01	40.0	µA
Input:						
Input forward voltage	V_F	I_F = 1.6 mA		1.65	2.0	V
Reverse breakdown voltage	B_{VR}	I_R = 10 µA	3			V
Output leakage current[3]	I_{I-O}	$R_H \leq$ 50%, T_A = 25 °C, V_{I-O} = 1500.0 V_{DC}			1.0	µA
Propagation delay time:						
Logic high to low	t_{PHL}	I_F = 0.5 mA, R_L = 4.7 kΩ, V_{CC} = 5.0 V, T_A = 25 °C		26.0	100.0	µs
		I_F = 5 mA, R_L = 680 Ω, V_{CC} = 5 V, T_A = 25 °C		2	10	µs
Logic low to high	t_{PLH}	I_F = 0.5 mA, R_L = 4.7 kΩ, V_{CC} = 5.0 V, T_A = 25 °C		28	60	µs
		I_F = 5 mA, R_L = 680 Ω, V_{CC} = 5 V, T_A = 25 °C		10	30	µs

[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] CTR is defined as the ratio of the output collector current I_C to the forward LED current I_F, multiplied by 100%.

[3] Measured between pins 1, 2, and 6 shorted together, and pins 3, 4, and 5 shorted together. T_A = 25°C and duration = 1 s.

Typical Performance Characteristics

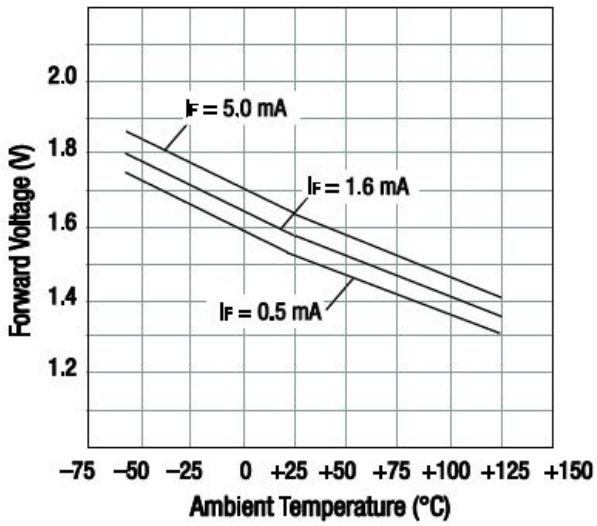

Figure 2. Forward Current vs Temperature

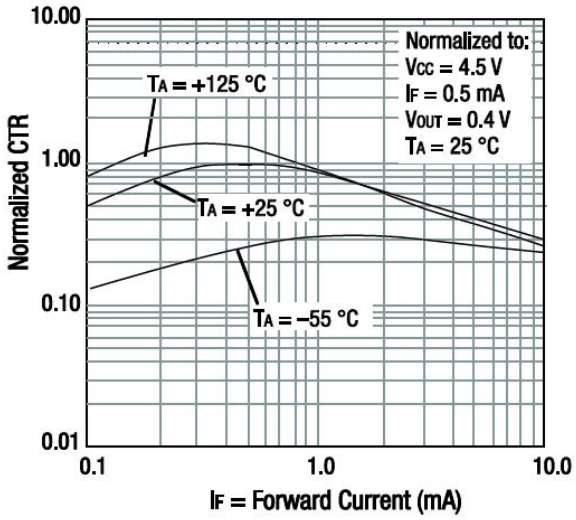

Figure 3. Normalized CTR vs Input Diode Forward Current

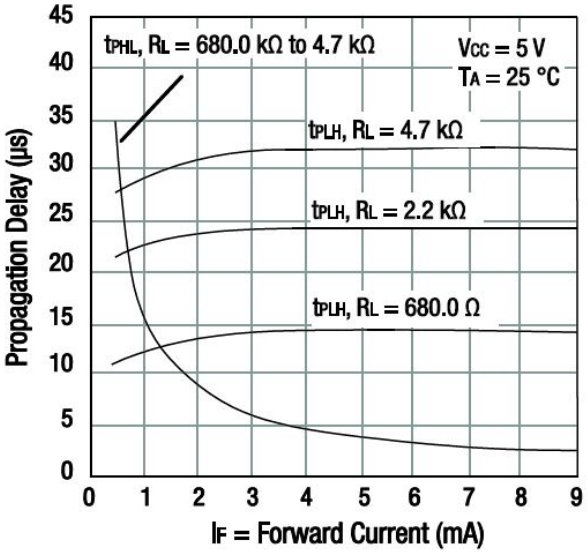

Figure 4. Propagation Delay vs Input Diode Forward Current

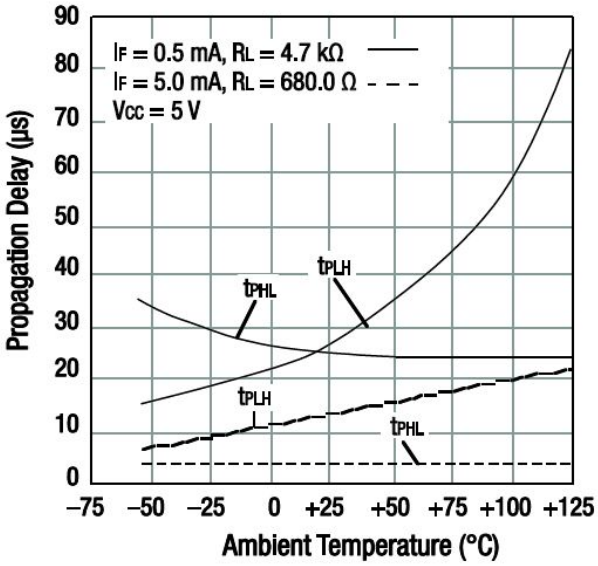

Figure 5. Propagation Delay vs Temperature

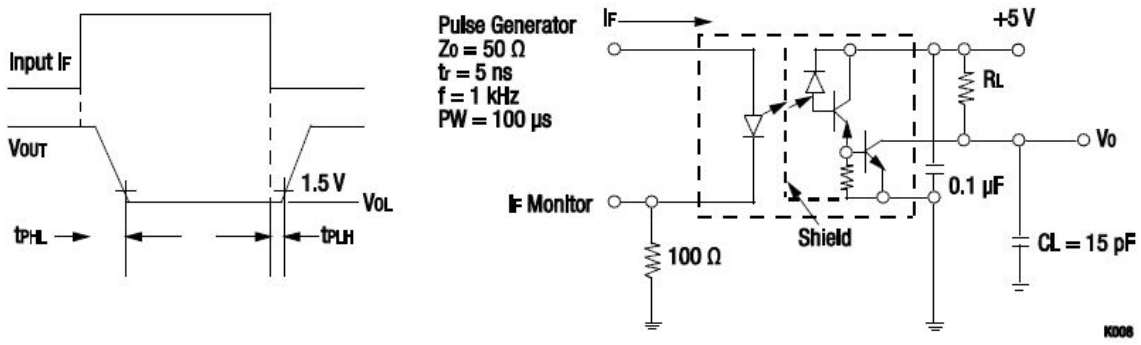

Figure 6. OLS400 Switching Test Circuit

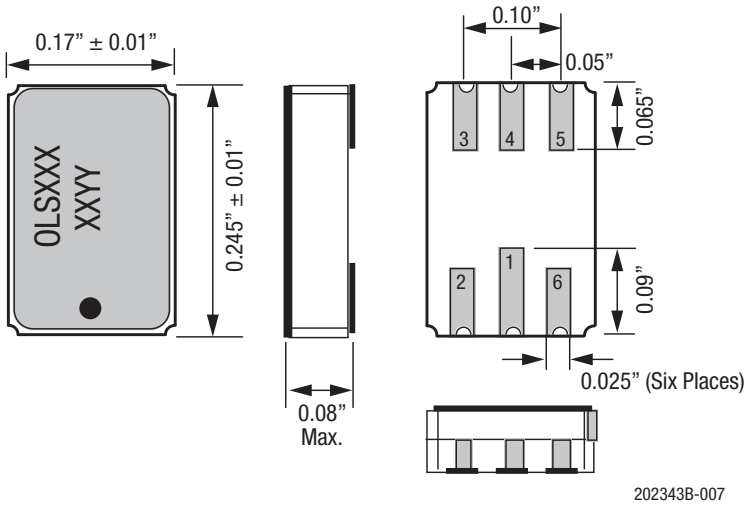

Figure 7. OLS400 Package Dimensions

Ordering Information

Model Name	Manufacturing Part Number
OLS400: High-Speed Hermetic, Low-Input Current Optocoupler	OLS400