

DATA SHEET

OLS100: Hermetic Surface-Mount Phototransistor Optocoupler

Features

- Current transfer ratio guaranteed over $-55\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ ambient temperature range
- Electrical isolation: 1500 V_{DC}
- High Current Transfer Ratio (CTR):
 - 75% minimum over temperature
 - At low input current, 100% at $I_F = 1\text{ mA}$ over temperature
- High reliability and rugged construction
- CTR-comparable to Darlington output, but with low saturation $V_{CE} = 0.15\text{ V}$
- Similar to 4N2X, 4N4X type optocouplers
- High reliability screenings on this product are available

Description

The OLS100 is designed especially for applications that require optical isolation with a high CTR and low saturation V_{CE} . Each OLS100 device consists of an LED and N-P-N silicon phototransistor, mounted and coupled in a custom hermetic surface-mount Leadless Chip Carrier (LCC) package.

The low input current makes the OLS100 well-suited for direct Complementary Metal Oxide Semiconductor (CMOS) to Low Power Schottky Transistor (LSTTL) to Transistor Logic (TTL) interfaces.

The OLS100 device can be mounted using reflow soldering or conductive epoxies.

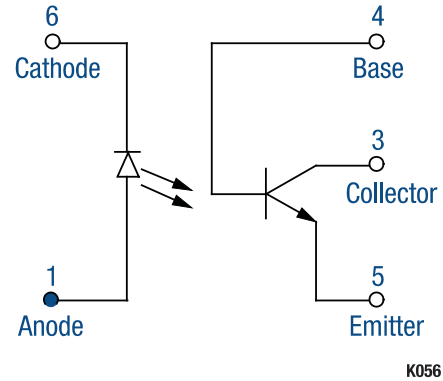


Figure 1. OLS100 Block Diagram

A functional block diagram of the OLS100 is shown in Figure 1. The absolute maximum ratings of the OLS100 are provided in Table 1. Electrical specifications are provided in Table 2.

Typical performance characteristics of the OLS100 are illustrated in Figures 2 through 5. A typical switching test circuit is shown in Figure 6, and package dimensions for the OLS100 are provided in Figure 7.

Table 1. OLS100 Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Minimum	Maximum	Units
Coupled				
Input to output isolation voltage (Note 2)	V _{OC}	-1500	+1500	V
Storage temperature range	T _{STG}	-65	+150	°C
Operating temperature range	T _A	-55	+125	°C
Mounting temperature range (3 minutes maximum)	T _{MTG}		+240	°C
Input Diode				
Average input current	I _{DD}		40	mA
Peak forward current (≤ 1 ms duration)	I _F		60	mA
Reverse voltage	V _R		3	V
Power dissipation	P _D		70	mW
Output Detector				
Collector to emitter voltage	V _{CE}		35	V
Emitter to collector voltage	V _{EC}		7	V
Collector to base voltage	V _{CB}		70	V
Power dissipation (Note 3)	P _D		300	mW

Note 1: 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.

Note 2: 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.

Note 3: Derate linearly at 3 mW/°C above 25 °C.

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. OLS100 Electrical Specifications (Note 1)
(T_A = -55 °C to +125 °C, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Current transfer ratio (Note 2)	CTR	I _F = 10 mA, V _{CE} = 5 V	100	200		%
		I _F = 1 mA, V _{CE} = 5 V	100	200		%
Saturation voltage	V _{CE_SAT}	I _F = 10.0 mA, I _C = 2.0 mA		0.15	0.3	V
Breakdown voltage:						
Collector to emitter	BV _{CEO}	I _{CE} = 100 μA, T _A = 25 °C	30			V
Collector to base	BV _{CBO}	I _{CB} = 10 μA, T _A = 25 °C	70			V
Emitter to collector	BV _{ECO}	I _{EC} = 100 μA, T _A = 25 °C	5			V
Leakage current (collector to emitter)	I _{CEO}	V _{CE} = 20 V, T _A = 25 °C			100	nA
		V _{CE} = 20 V, T _A = 100 °C			100	μA
Input:						
Forward voltage	V _F	I _F = 10.0 mA	0.9	1.5	1.9	V
Reverse current	I _R	V _R = 3.0 V			100.0	μA
Output leakage current (Note 3)	I _{L_O}	R _H ≤ 50%, T _A = 25 °C, V _{L_O} = 1500.0 V _{DC}			1.0	μA
Output capacitance (Note 3)	C _{L_O}	f = 1 MHz			5	pF
Time:						
Turn on	t _{ON}	V _{CC} = 10 V, R _L = 100 Ω I _C = 2 mA, T _A = 25 °C		5	15	μs
Turn off	t _{OFF}	V _{CC} = 10 V, R _L = 100 Ω I _C = 2 mA, T _A = 25 °C		5	15	μs

Note 1: Performance is guaranteed only under the conditions listed in this table.

Note 2: CTR is defined as the ratio of output collector current (I_C) to the forward LED current (I_F) multiplied by 100%.

Note 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
 (Top = -55 °C to +125 °C, Unless Otherwise Noted)

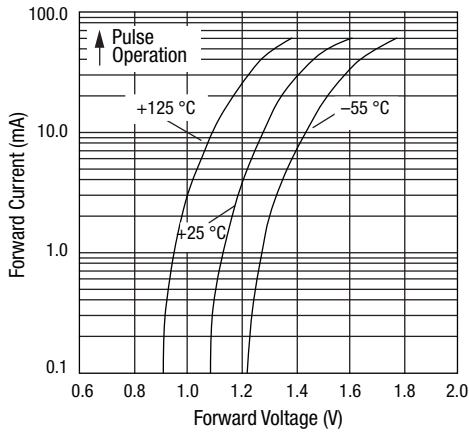


Figure 2. Forward Current vs Forward Voltage

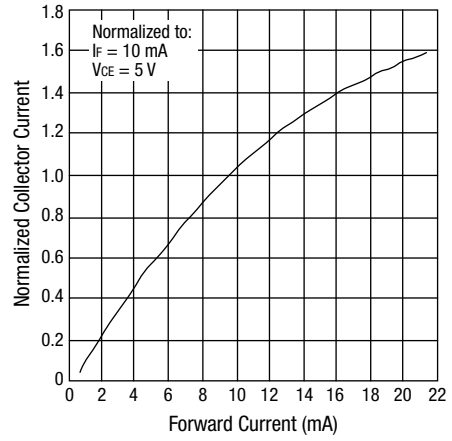


Figure 3. Normalized Collector Current vs Forward Current

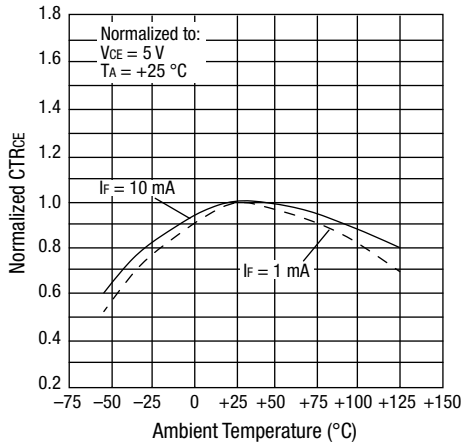


Figure 4. Normalized CTRce vs Temperature

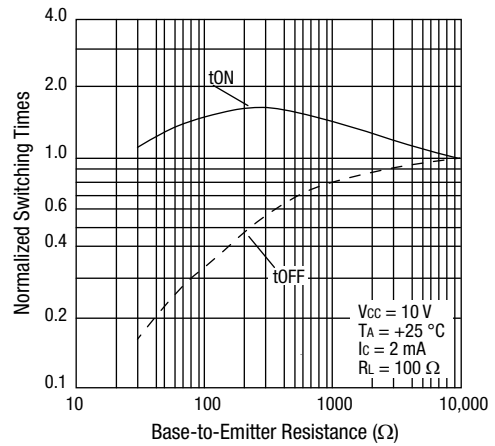


Figure 5. Normalized Switching Times vs Base-to-Emitter Resistance

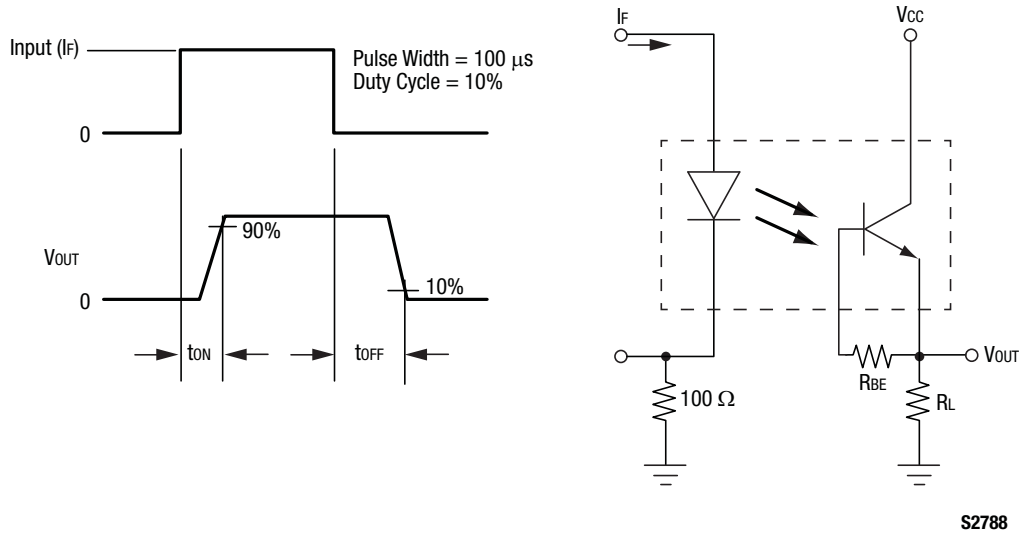


Figure 6. OLS100 Switching Test Circuit

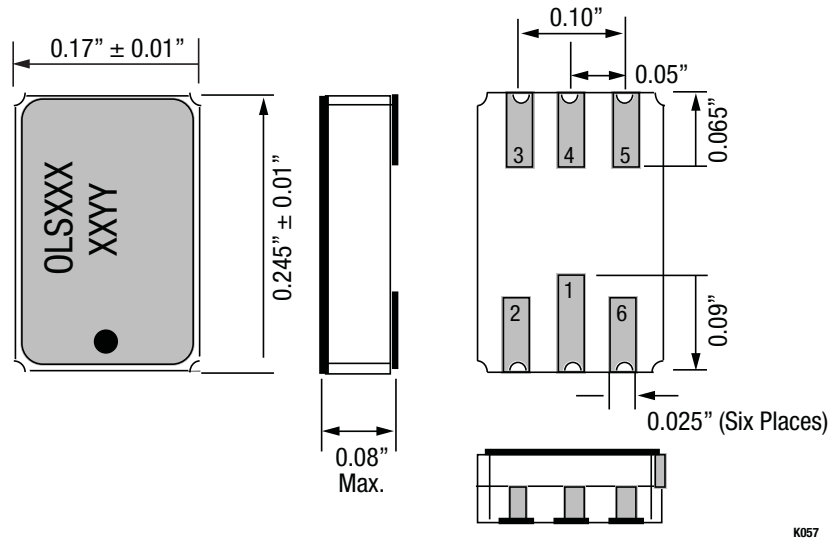


Figure 7. OLS100 Package Dimensions

Ordering Information

Model Name	Manufacturing Part Number
OLS100: Hermetic Surface-Mount Phototransistor Optocoupler	OLS100

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