DATA SHEET

OLS100: Hermetic Surface-Mount Phototransistor Optocoupler

Features

- Current transfer ratio guaranteed over –55 °C to +125 °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 mA over temperature
- High reliability and rugged construction
- CTR-comparable to Darlington output, but with low saturation V_{CE} = 0.15 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.

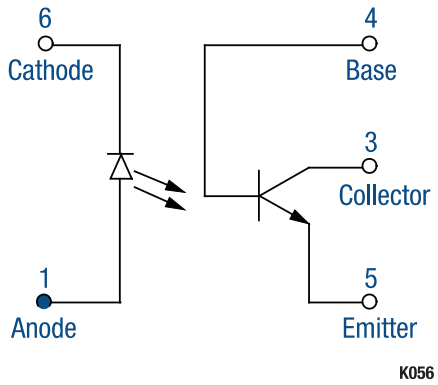

Figure 1. OLS100 Block Diagram

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_{DC}	–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_{I_O}	R_H ≤50%, T_A = 25 °C, V_{I_O} = 1500.0 V_{DC}			1.0	µA
Output capacitance (Note 3)	C_{I_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
(T_{OP} = –55 °C to +125 °C, Unless Otherwise Noted)

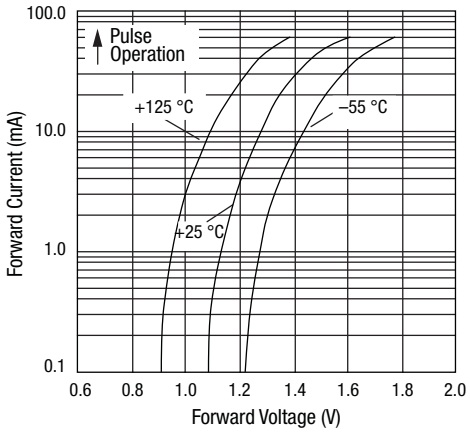

Figure 2. Forward Current vs Forward Voltage

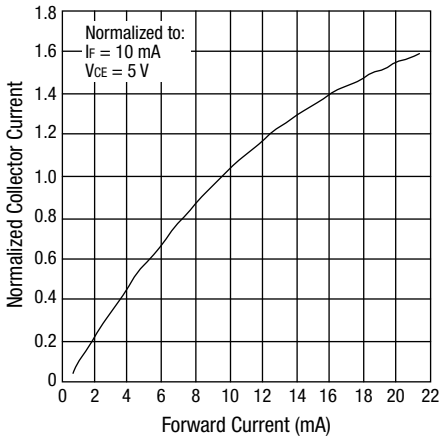

Figure 3. Normalized Collector Current vs Forward Current

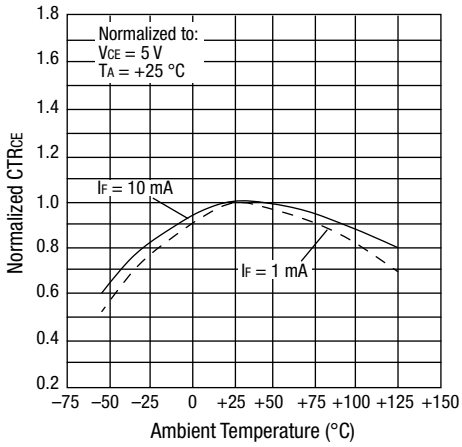

Figure 4. Normalized CTR_{CE} vs Temperature

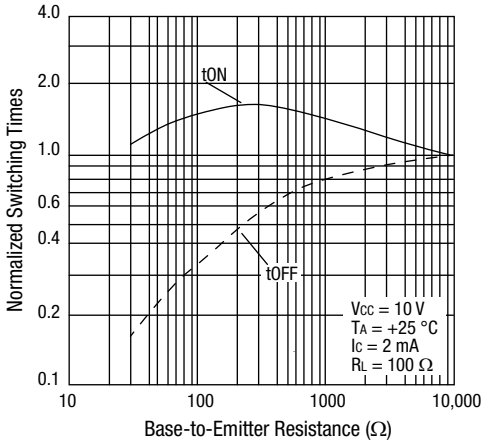

Figure 5. Normalized Switching Times vs Base-to-Emitter Resistance

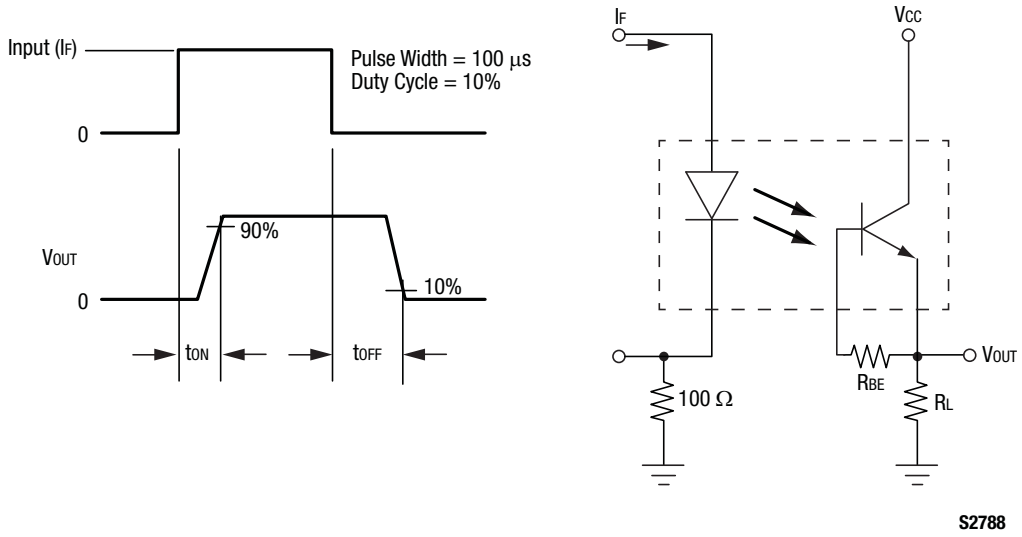

Figure 6. OLS100 Switching Test Circuit

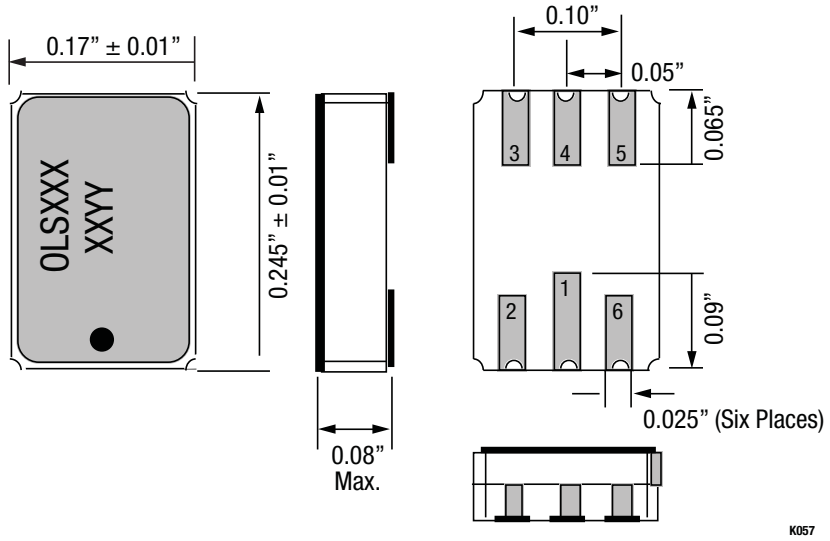

Figure 7. OLS100 Package Dimensions

Ordering Information

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

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