

DATA SHEET

# OLI100: Miniature Phototransistor Optocoupler for Hybrid Assembly

## Features

- Current transfer ratio guaranteed over -55 °C to +125 °C ambient temperature range
- Electrical isolation: 1500 VDC
- High current transfer ratio: 100% minimum over temperature
- High current transfer ratio 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  $V_{CE} = 0.15 \text{ V}$  typical
- Similar to 4N2X, 4N3X type optocouplers
- Custom package available

## Description

The OLI100 is designed especially for hybrid applications that require optical isolation with a high current transfer ratio and low saturation  $V_{CE}$ . The device consists of a light emitting diode, and an N-P-N silicon phototransistor mounted and coupled in a miniature custom ceramic package.

The very low input current makes the OLI100 well suited for direct CMOS to Low Power Schottky Transistor to Transistor Logic (LSTTL/TTL) interfaces.

The OLI100 is mounted by standard hybrid assembly with non-conductive epoxies. Gold or aluminum wire bonding can be used to make electrical connections for maximum placement flexibility.

**NOTE:** *Certain cleaning processes may be harmful to this device. Please consult Isolink for details.*

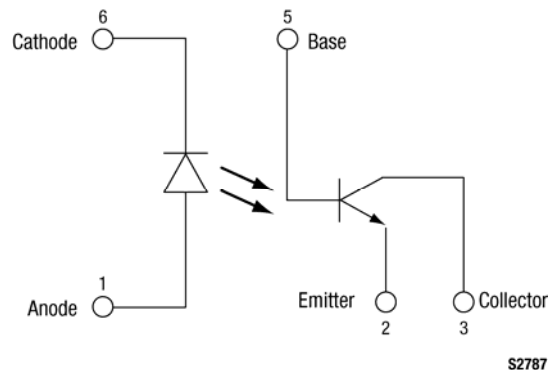


Figure 1. OLI100 Block Diagram

A functional block diagram of the OLI100 is shown in Figure 1. The absolute maximum ratings of the OLI100 are provided in Table 1. Electrical specifications are provided in Table 2.

Typical performance characteristics of the OLI100 are illustrated in Figures 2 through 5. A typical switching test circuit is shown in Figure 6 and package dimensions for the OLI100 are provided in Figure 7.

**Table 1. OLI100 Absolute Maximum Ratings<sup>1</sup>**

Parameter	Symbol	Minimum	Maximum	Units
<b><i>Coupled</i></b>				
Input to output isolation voltage <sup>2</sup>	V <sub>DC</sub>		±1500	V
Storage temperature	T <sub>STG</sub>	-65	+150	°C
Operating temperature	T <sub>A</sub>	-55	+125	°C
Mounting temperature (3 minutes maximum)	T <sub>MTG</sub>		+240	°C
<b><i>Input Diode</i></b>				
Average input current	I <sub>DD</sub>		40	mA
Peak forward current (≤ 1 ms duration)	I <sub>F</sub>		60	mA
Reverse voltage	V <sub>R</sub>		3	V
Power dissipation	P <sub>D</sub>		70	mW
<b><i>Output Detector</i></b>				
Collector to emitter voltage	V <sub>CE</sub>		35	V
Emitter to collector voltage	V <sub>EC</sub>		7	V
Collector to base voltage	V <sub>CB</sub>		70	V
Power dissipation <sup>3</sup>	P <sub>D</sub>		300	mW

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

<sup>3</sup> Derate linearly at 3.0 mW/°C above 25 °C.

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**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.*

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**Table 2. OLI100 Electrical Specifications<sup>1</sup>**  
**(T<sub>A</sub> = -55 °C to +125 °C, Unless Otherwise Noted)**

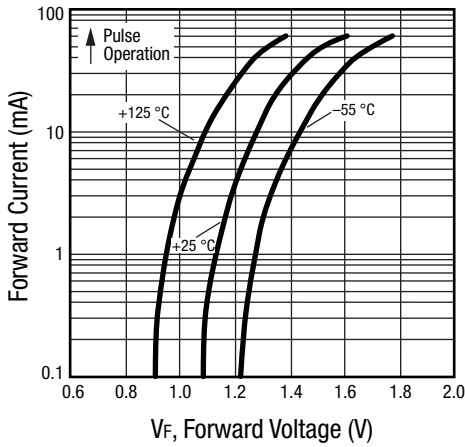
Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Current transfer ratio <sup>2</sup>	CTR	I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 5 V	100	200		%
		I <sub>F</sub> = 1 mA, V <sub>CE</sub> = 5 V	100	200		%
Saturation voltage	V <sub>CE_SAT</sub>	I <sub>F</sub> = 10 mA, I <sub>C</sub> = 2 mA		0.15	0.30	V
Breakdown voltage: Collector to emitter Collector to base Emitter to collector	BV <sub>CEO</sub>	I <sub>CE</sub> = 100 μA, T <sub>A</sub> = 25 °C	30			V
	BV <sub>CBO</sub>	I <sub>CB</sub> = 10 μA, T <sub>A</sub> = 25 °C	70			V
	BV <sub>ECO</sub>	I <sub>EC</sub> = 100 μA, T <sub>A</sub> = 25 °C	5			V
Leakage current (collector to emitter)	I <sub>CEO</sub>	V <sub>CE</sub> = 20 V, T <sub>A</sub> = 25 °C			100	nA
		V <sub>CE</sub> = 20 V, T <sub>A</sub> = 100 °C			100	μA
Input forward voltage	V <sub>F</sub>	I <sub>F</sub> = 10 mA	0.9	1.3	1.7	V
Input reverse current	I <sub>R</sub>	V <sub>R</sub> = 3 V			100	μA
Input to output leakage current <sup>3</sup>	I <sub>I_O</sub>	Relative humidity ≤50%, T <sub>A</sub> = 25 °C, V <sub>I_O</sub> = 1500 V <sub>DC</sub>			1	μA
Turn-on time	t <sub>ON</sub>	V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω, I <sub>C</sub> = 2 mA, T <sub>A</sub> = 25 °C		5	15	μs
Turn-off time	t <sub>OFF</sub>	V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω, I <sub>C</sub> = 2 mA, T <sub>A</sub> = 25 °C		5	15	μs

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

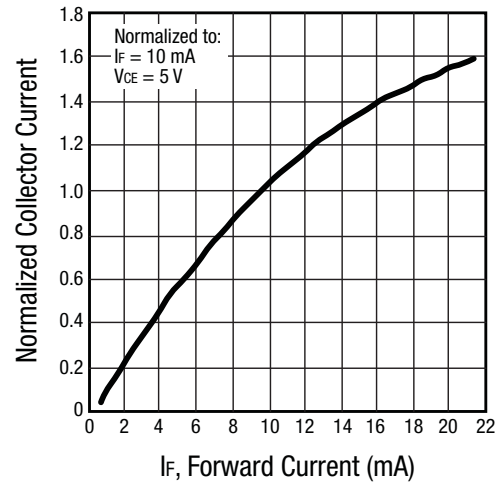
<sup>2</sup> CTR is defined as the ratio of output collector current (I<sub>C</sub>) to the forward LED current (I<sub>F</sub>) multiplied by 100%.

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

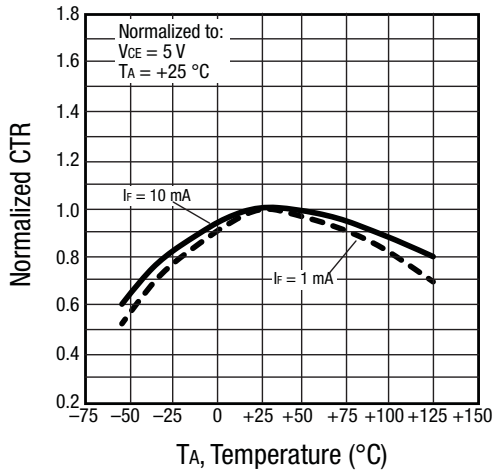
**Typical Performance Characteristics**  
 (T<sub>OP</sub> = -55 °C to +125 °C, Unless Otherwise Noted)



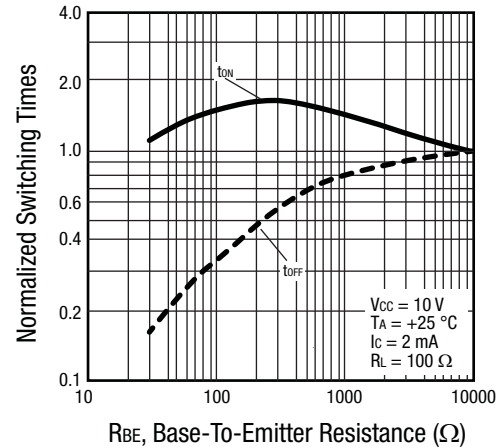
**Figure 2. Diode Forward Characteristics**



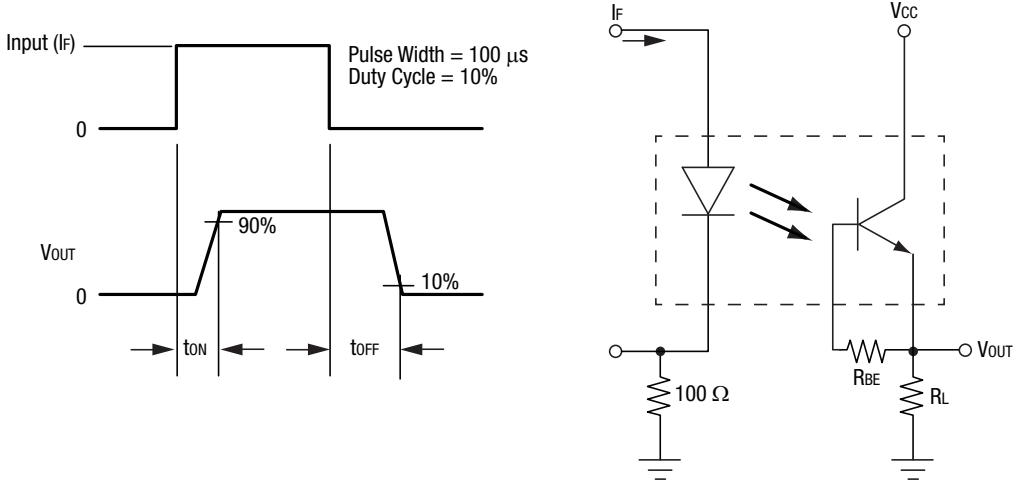
**Figure 3. Normalized Collector Current vs. Forward Current**



**Figure 4. Normalized CTR vs Temperature**

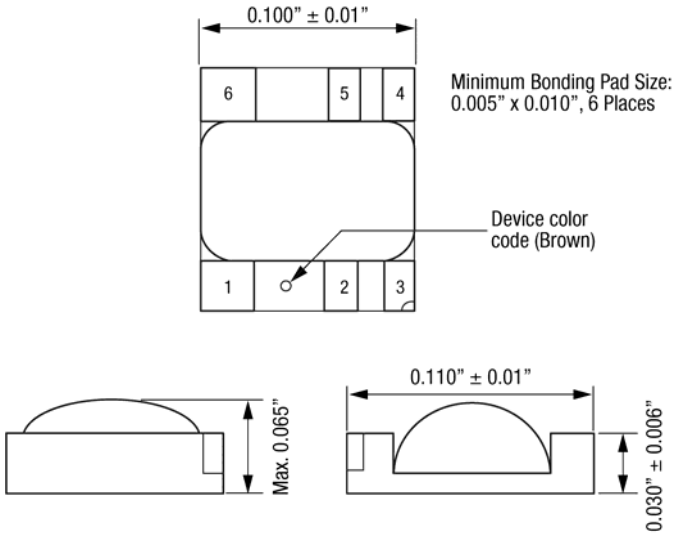


**Figure 5. Switching Speed vs Base-to-Emitter Resistance**



S2788

Figure 6. OLI100 Switching Test Circuit



S3079

Figure 7. OLI100 Package Dimensions

## Ordering Information

Part Number	Product Description
OLI100	Miniature Phototransistor Optocoupler for Hybrid Assembly

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