OLI920: Hybrid Smart Photovoltaic Optocoupler

Features

- Isolated MOSFET/IGBT gate drive
- Fast turn-off circuitry
- dV/dt protection circuitry
- Performance guaranteed over –55 °C to +125 °C ambient temperature range
- 2500 V$_{DC}$ electrical isolation
- High open-circuit voltage
- High short-circuit current
- Small size for hybrid assembly
- High reliability construction
- Radiation tolerant

Description

The OLI920 consists of a pair of LEDs that are optically coupled to a dielectrically isolated photovoltaic diode array, packaged on a thick film ceramic substrate. When the LED is energized, the infrared emission is detected by the photovoltaic array and a DC output voltage is generated. This electrically isolated voltage can be used to drive the gates of Metal Oxide Semiconductor (MOS) devices. Additional control circuitry provides fast turn-off, protection for false turn-on, and gate protection.

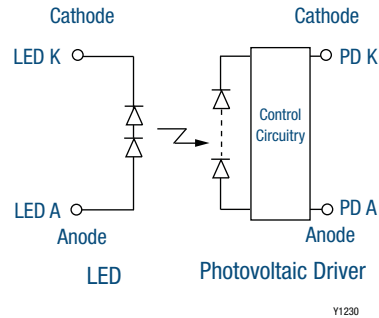Surface mounting can be accomplished with conductive epoxies or reflow soldering.

Figure 1. OLI920 Block Diagram

Figure 1 shows the OLI920 functional block diagram. Table 1 provides the OLI920 absolute maximum ratings. Table 2 provides the OLI920 electrical specifications.

Figures 2 through 6 illustrate the OLI920 typical performance characteristics. Figure 7 shows the OLI920 package dimensions.

Table 1. OLI920 Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Minimum	Maximum	Units
Coupled				
Input to output isolation voltage (Note 2)	V_{DC}	−2500	+2500	V
Storage temperature range	T_{STG}	−65	+150	°C
Operating temperature range	T_A	−55	+125	°C
Mounting temperature range (3 minutes maximum)			+240	°C
Input Diode				
Average input current	I_{DD}		100	mA
Peak forward current (≤1 ms duration)	I_F		180	mA
Reverse voltage	V_R		5	V
Power dissipation	P_D		200	mW
Output Detector				
Forward voltage	V_F		14	V
Reverse voltage	V_R		1.5	V

Note 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.

Note 2: Measured between LED pins shorted together and output pins shorted together. T_A = 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. OLI920 Electrical Specifications (Note 1)
(T_A = −55 °C to +125 °C, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Minimum	Typical	Maximum	Units
Open circuit voltage	V_{OC}	I_F = 10 mA	7.5	10		V
Short circuit current	I_{SC}	I_F = 10 mA	−7	−20		µA
Input:						
Forward voltage	V_F	I_F = 10 mA, T_A = 25 °C	2.4	2.8	3.4	V
		I_F = 10 mA, T_A = −55 °C	2.8		3.85	V
		I_F = 10 mA, T_A = 125 °C	2.2		3.0	V
Reverse breakdown voltage	B_{VR}	I_R = 10 µA	5			V
Output leakage current (Note 2)	I_{I_O}	R_H ≤50%, 1500 V_{DC}, T_A = 25 °C, Duration = 1 s			1	µA
Time:						
Turn-on	t_{ON}	I_F = 10 mA, PW = 100 µs, f = 1 kHz, C = 15 pf, T_A = 25 °C, R_L = 10 MΩ		60		µs
Turn-off	t_{OFF}	t_{ON} = 0% to 90% t_{OFF} = 100% to 10%		1		µs

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

Note 2: Measured between LED pins shorted together and output pins shorted together. T_A = 25°C and duration = 1 s.

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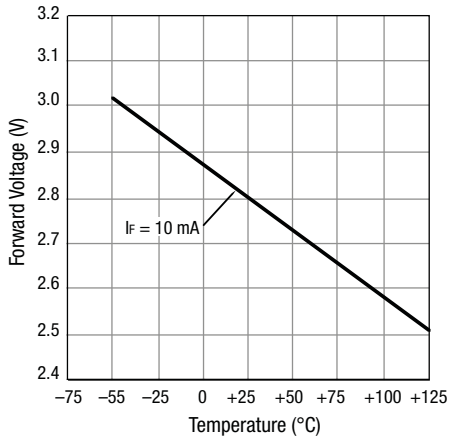
Typical Performance Characteristics

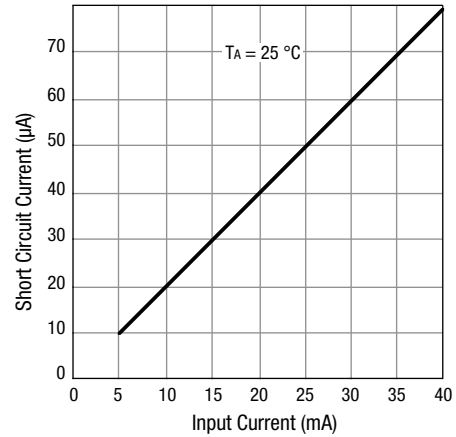**Figure 2. LED Forward Voltage vs Temperature**

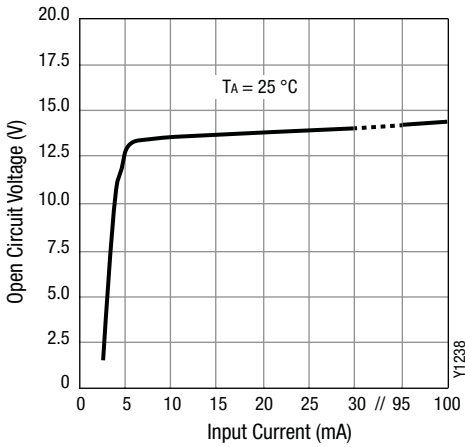**Figure 3. Short Circuit Current vs Input Current**
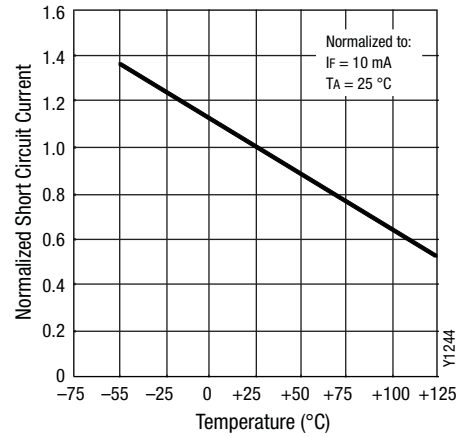

Figure 4. Open Circuit Voltage vs Input Current
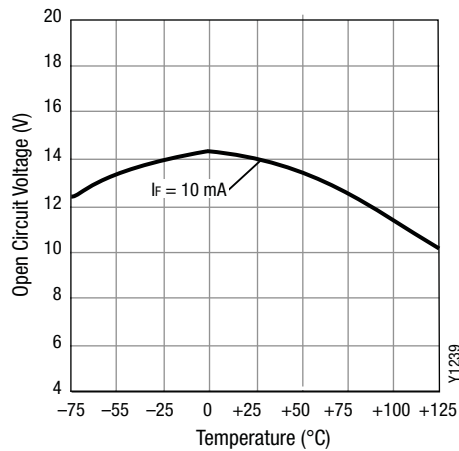

Figure 5. Normalized Short Circuit Current vs Temperature

Figure 6: Open Circuit Voltage vs Temperature

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0.145" ±0.010
Square

LED Anode ID Mark
(White)

Black Epoxy Coating

0.080" Max

0.020" Min

LED A   LED K

0.070" Min

Backside Metallization: Pt/Au

0.040" x3

0.020" Min

PD K   PD A
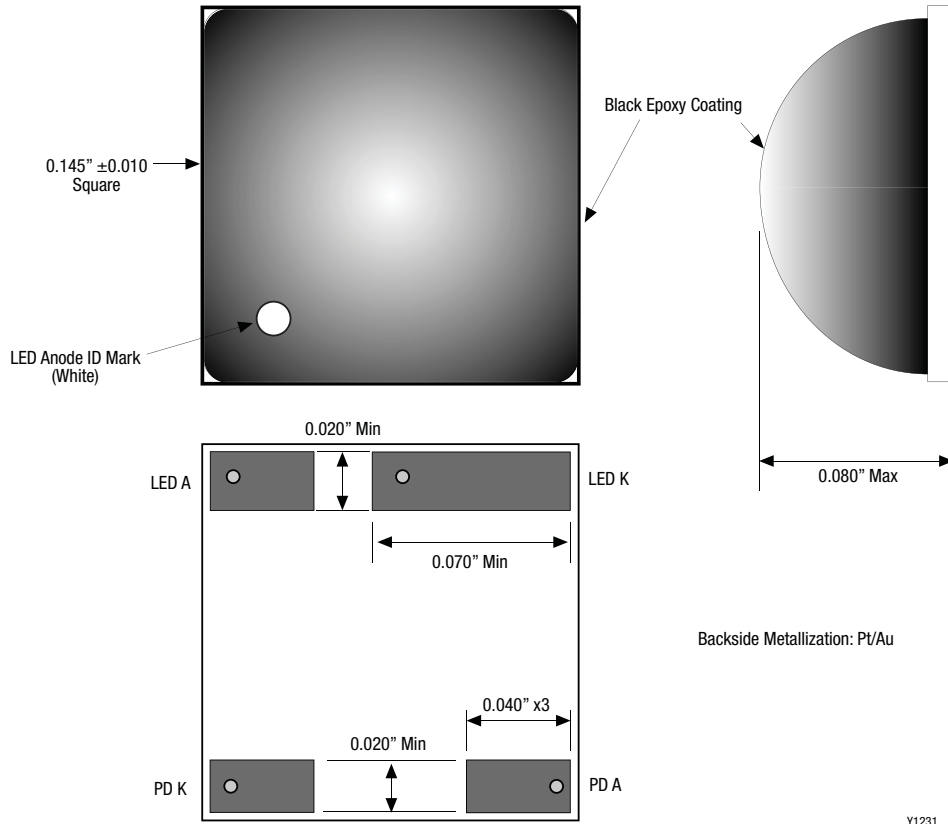
Y1231

Figure 7. OLI920 Package Dimensions

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Ordering Information

Model Name	Manufacturing Part Number
OLI920: Hybrid Smart Photovoltaic Optocoupler	OLI920