DATA SHEET

OLI400: Miniature Low Input Current Optocoupler for Hybrid Assembly

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_{CE-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)
- Radiation tolerant design

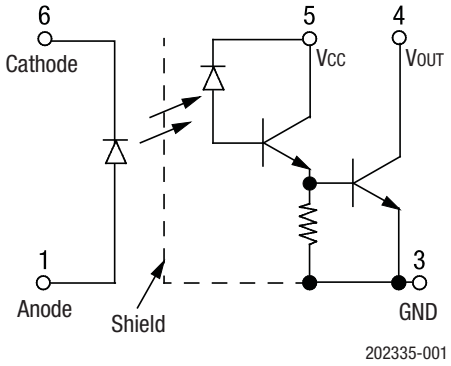

Figure 1. OLI400 Block Diagram

Description

The OLI400 has a high CTR at low input currents, which makes it ideal for applications such as Metal Oxide Semiconductors (MOSs), Complementary Metal Oxide Semiconductors (CMOSs), and low power logic interface/RS-232C data transmission systems.

Each OLI400 has an LED and integrated photodiode Darlington detector IC mounted and coupled in a miniature custom ceramic package, that provides 1500 V_{DC} electrical isolation between the input and output. The Darlington detector has an integrated base-emitter resistor for superior high temperature performance. The split Darlington design permits lower output saturation voltage and higher switching speed operation than possible with conventional photodarlington designs.

Device mounting is achieved by a 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. Contact Isolink for details.*

Figure 1 shows the OLI400 functional block diagram. Table 1 provides the OLI400 absolute maximum ratings. Table 2 provides the OLI400 electrical specifications.

Figures 2 through 5 illustrate the OLI400 typical performance characteristics. Figure 6 shows the OLI400 switching test circuit. Figure 7 provides the OLI400 package dimensions.

Table 1. OLI400 Absolute Maximum Ratings [1]

Parameter	Symbol	Minimum	Maximum	Units
Coupled				
Input to output isolation voltage [1]	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)			+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	P_D		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	P_D		+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 and 6 shorted together, and pins 2, 3, 4, and 5 shorted together. T_A =25 °C and duration = 1 s.

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.*

Table 2. OLI400 Electrical Specifications [1]
(T_A = –55 °C to +125 °C, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Minimum	Typical	Maximum	Units
Current transfer ratio [2]	CTR	I_F = 0.5 mA, V_O = 0.4 V, V_{CC} = 4.5 V	300.0			%
		I_F = 1.6 mA, V_O = 0.4 V, V_{CC} = 4.5 V	300.0			%
		I_F = 5.0 mA, V_O = 0.4 V, V_{CC} = 4.5 V	200.0			%
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 = 0.5 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 V		0.005	250.0	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 V		0.01	40.0	µA
Input:						
Forward voltage	V_F	I_F = 1.6 mA		1.65	2.0	V
Reverse breakdown voltage	B_{VR}	I_R = 10 µA	3.0			V
Output leakage current [3]	I_{I_O}	R_H ≤50%, T_A = 25 °C, V_{I_O} = 1500 V_{DC}			1.0	µA
Propagation delay time:						
Logic high to low	t_{PHL}	I_F = 0.5 mA, R_L = 4.7 kΩ		26	100	µs
		I_F = 5.0 mA, R_L = 680.0 Ω		2	10	µs
Logic low to high	t_{PLH}	I_F = 0.5 mA, R_L = 4.7 kΩ		28	60	µs
		I_F = 5.0 mA, R_L = 680.0 Ω		10	30	µs

[1] Performance is guaranteed only under the conditions listed in the above table.

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

Typical Performance Characteristics

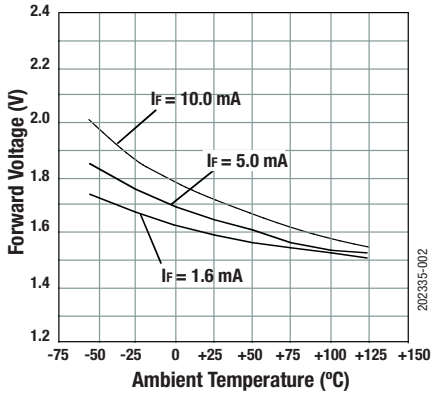

Figure 2. Forward Voltage vs Temperature

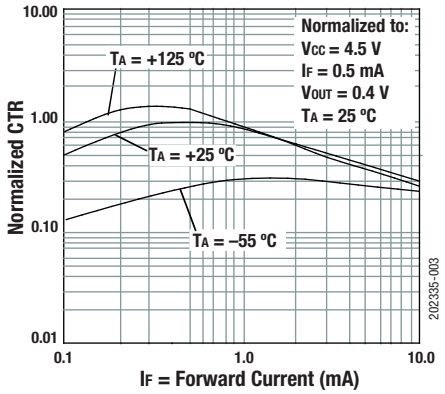

Figure 3. Normalized CTR vs Input Diode Forward Current

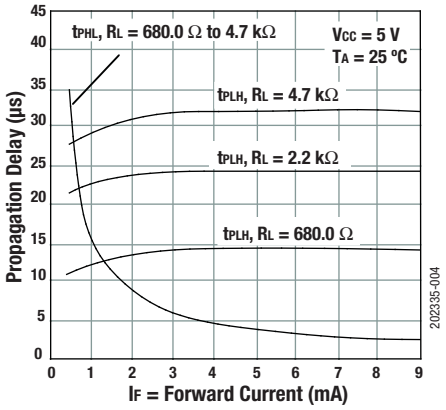

Figure 4. Propagation Delay vs Input Diode Forward Current

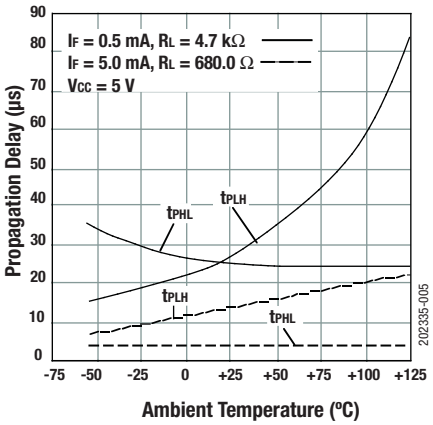

Figure 5. Propagation Delay vs Temperature

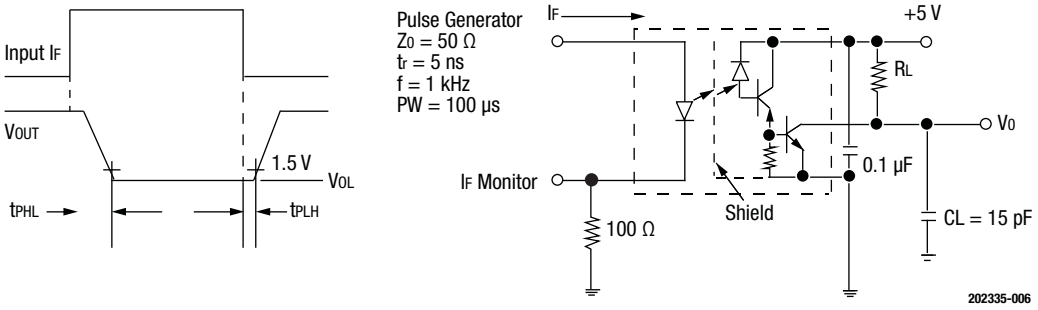

Figure 6. OLI400 Switching Test Circuit

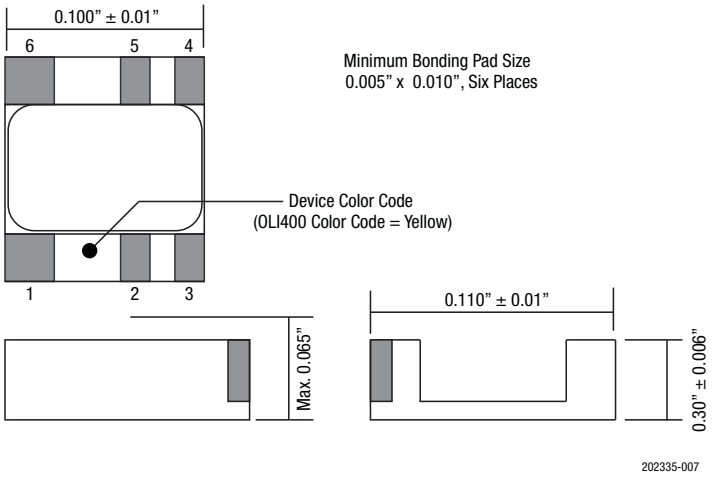

Figure 7. OLI400 Package Dimensions

Ordering Information

Model Name	Manufacturing Part Number
OLI400: Miniature Low Input Current Optocoupler for Hybrid Assemby	OLI400