DATA SHEET

OLH500: High CMR, High-Speed Logic Gate Hermetic Optocoupler

Features

- Performance guaranteed over –55 °C to +125 °C ambient temperature range
- Guaranteed minimum Common Mode Rejection (CMR) transient immunity, >1000 V/µs
- 1000 V_{DC} electrical isolation
- Low-Power Schottky Transistor-Transistor Logic (LSTTL)/ Transistor-to-Transistor Logic (TTL) compatible
- High-speed, 10 Mbps typical
- Low input LED current
- Similar to 6N134, 6N137, and HCPL2601
- Radiation tolerant
- Offers 100% high reliability screenings

Description

The OLH500 is suitable for high-speed digital interfacing applications, elimination of ground loops, and input/output buffering. Each OLH500 has an LED and integrated high-speed detector mounted and coupled in a TO-5 hermetic package, that provides 1000 V_{DC} electrical isolation between the input and output. The light from the LED is collected by the photo-diode in the integrated detector and amplified by a high gain linear amplifier that drives a Schottky-clamped open collector output transistor. Typical propagation delay for the OLH500 is 60 ns. The internal shield improves common mode transient immunity to 1000 V/µs minimum.

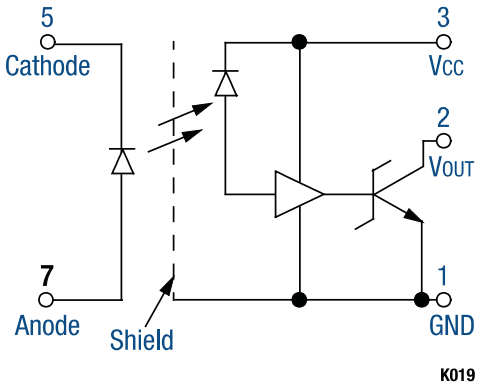

Figure 1. OLH500 Block Diagram

Figure 1 shows the OLH500 functional block diagram. Table 1 provides the OLH500 absolute maximum ratings. Table 2 provides the OLH500 electrical specifications.

Figures 2 through 5 illustrate the OLH500 typical performance characteristics. Figure 6 shows the OLH500 switching test circuit. Figure 7 provides the OLH500 package dimensions.

Table 1. OLH500 Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Minimum	Maximum	Units
Coupled				
Input to output isolation voltage (Note 2)	V_{DC}	–1000	+1000	V
Storage temperature range	T_{STG}	–65	+150	°C
Operating temperature range	T_A	–55	+125	°C
Lead temperature (1.6 mm from case for 10 seconds)			+240	°C
Total power dissipation	P_D		+170	mW
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				
Peak output current			25	mA
Supply voltage (1 minute maximum)	V_{CC}		7	V
Output collector power dissipation	P_D		40	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 3 shorted together, and pins 5, 6, and 7 shorted together. T_A = 25°C and duration = 1 second.

***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. OLH500 Electrical Specifications (Note 1)
(T_A = –55 °C to +125 °C, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Minimum	Typical	Maximum	Units
Low level output voltage (Note 2)	V_{OL}	V_{CC} = 5.5 V, I_{OL} = 10 mA, I_F = 5 mA		0.4	0.6	V
High level output current (Note 2)	I_{OH}	V_{CC} = V_O = 5.5 V, I_F = 250 µA		5	250	µA
High level supply current (Note 2)	I_{CCH}	V_{CC} = 5.5 V, I_F = 0 mA		11	16	mA
Low level supply current (Note 2)	I_{CCL}	V_{CC} = 5.5 V, I_F = 5 mA		16	20	mA
Input forward voltage	V_F	I_F = 10 mA		1.8	2.5	V
Input reverse breakdown voltage	B_{VR}	I_F = 10 µA	3			V
Input to output leakage current (Note 3)	I_{I_O}	Relative humidity ≤50%, T_A = 25 °C, V_{I_O} = 1000 V_{DC}			1	µA
Propagation delay time (Note 2):						
Logic high to low	t_{PHL}	I_F = 7.5 mA, V_{CC} = 5 V, R_L = 510 Ω		60	140	ns
Logic low to high	t_{PLH}	I_F = 7.5 mA, V_{CC} = 5 V, R_L = 510 Ω		60	140	ns
Common mode transient immunity (Note 2):						
High output	CM_H	V_{CM} = 50 V peak, V_O (minimum) = 2.0 V, R_L = 510 Ω, I_F = 0 mA, T_A = 25 °C	1000	10,000		V/µs
Low output	CM_L	V_{CM} = 50 V peak, V_O (minimum) = 0.8 V, R_L = 510 Ω, I_F = 5 mA, T_A = 25 °C	1000	10,000		V/µs

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: A ceramic bypass capacitor (0.01 µF to 0.1 µF) is required between pins 3 and 5 to stabilize the operation of the amplifier.

Note 3: Measured between pins 1, 2, 3, and 4 shorted together, and pins 5, 6, 7, and 8 shorted together. T_A = 25°C and duration = 1 second.

Typical Performance Characteristics

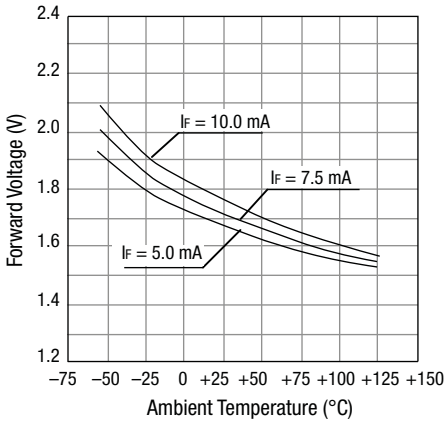

Figure 2. Input Diode Forward Voltage vs Temperature

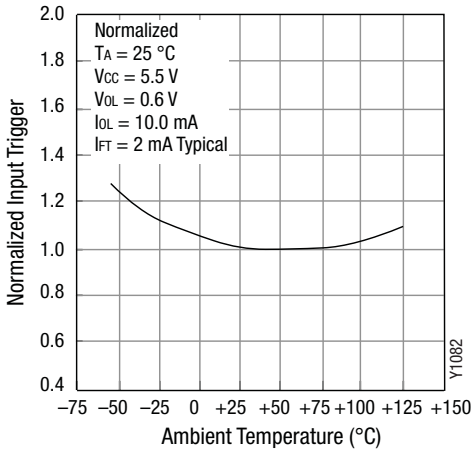

Figure 3. Normalized Input Trigger Current vs Temperature

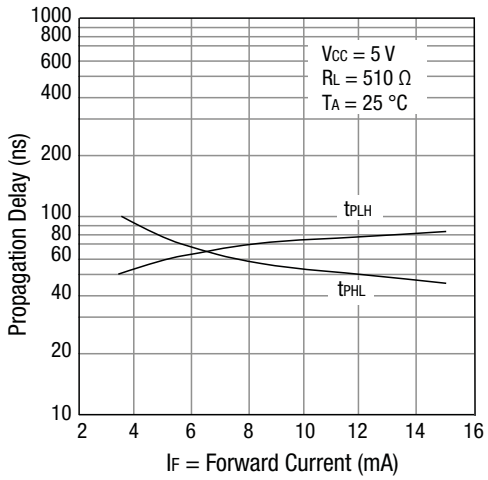

Figure 4. Propagation Delay vs Input Forward Current

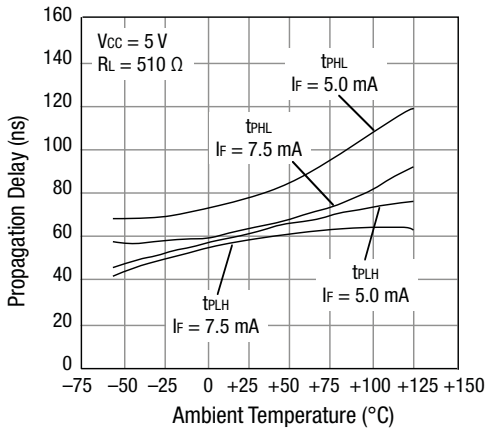

Figure 5. Propagation Delay vs Temperature

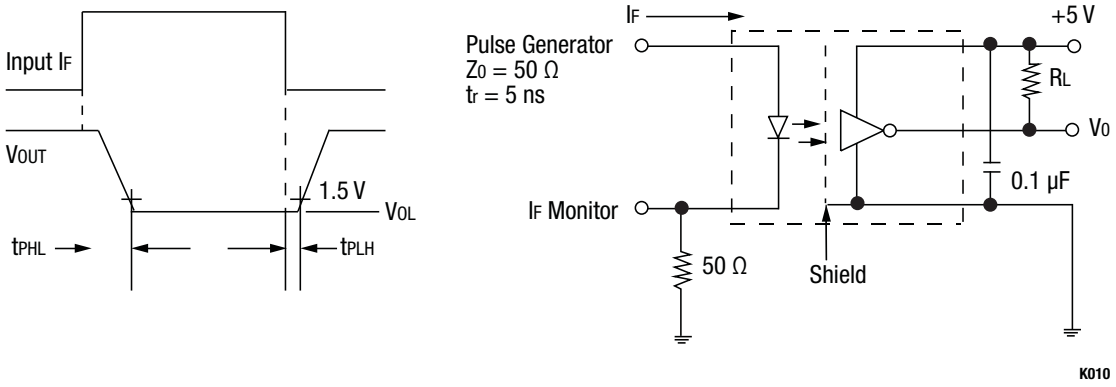

Figure 6. OLH500 Switching Test Circuit

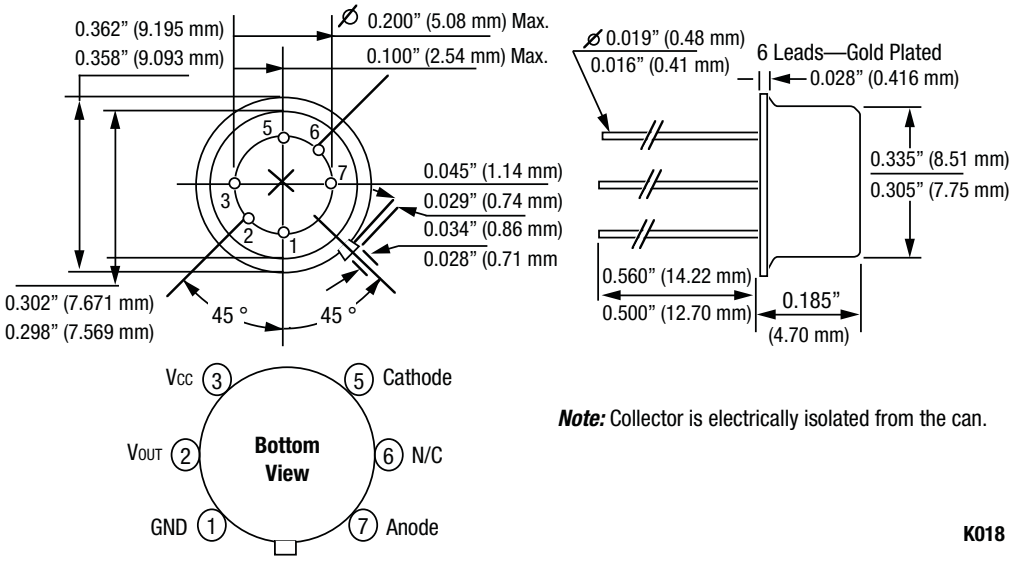

Figure 7. OLH500 Package Dimensions

Ordering Information

Model Name	Manufacturing Part Number
OLH500: High CMR, High-Speed Logic Gate Hermetic Optocoupler	OLH500