

DATA SHEET

OLH7000: Hermetic Linear Optocoupler

Features

- High reliability and rugged hermetic construction
- Couples AC and DC signals
- 1000 V_{DC} electrical isolation
- Matched photodiodes
- Excellent linearity and stability

Description

The OLH7000 linear optocoupler consists of two LEDs in a series coupled to two PIN photodiode detectors.

The photodiode on the input side acts as a feedback device that permits an external feedback loop to ensure constant LED light output. A similar matching photodiode on the output side is used to drive an output circuit that is electrically isolated from the input. A fixed relationship is thus maintained between the input and output, and compensates for the LED's nonlinear, time, and temperature characteristics.

Each OLH7000 is mounted and coupled in a hermetic 8-pin ceramic dual in-line package (DIP) that provides 1000 V_{DC} electrical isolation between the input and output.

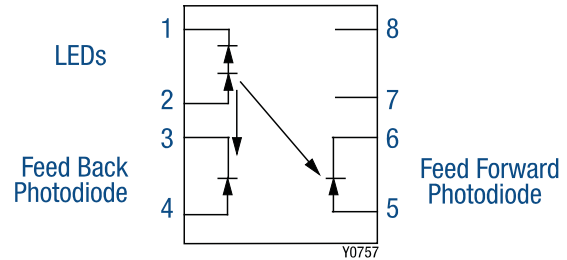


Figure 1. OLH7000 Block Diagram

Figure 1 shows the OLH7000 functional block diagram. Table 1 provides the OLH7000 absolute maximum ratings. Table 2 provides the OLH7000 electrical specifications.

Figure 2 shows the OLH7000 switching test circuit. Figure 3 provides the OLH7000 package dimensions.

Table 1. OLH7000 Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Minimum	Maximum	Units
<i>Coupled</i>				
Input to output isolation voltage	V _{DC}	-1000	+1000	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
Total power dissipation	P _D		+250	mW
<i>Input Diode</i>				
Average input current	I _{DD}		60	mA
Peak forward current (≤1ms duration)	I _F		100	mA
Reverse voltage	V _R		6	V
Power dissipation	P _D		100	mW
<i>Output Detector</i>				
Reverse voltage	V _R		30	V
Forward voltage	V _F		0.3	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.

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.

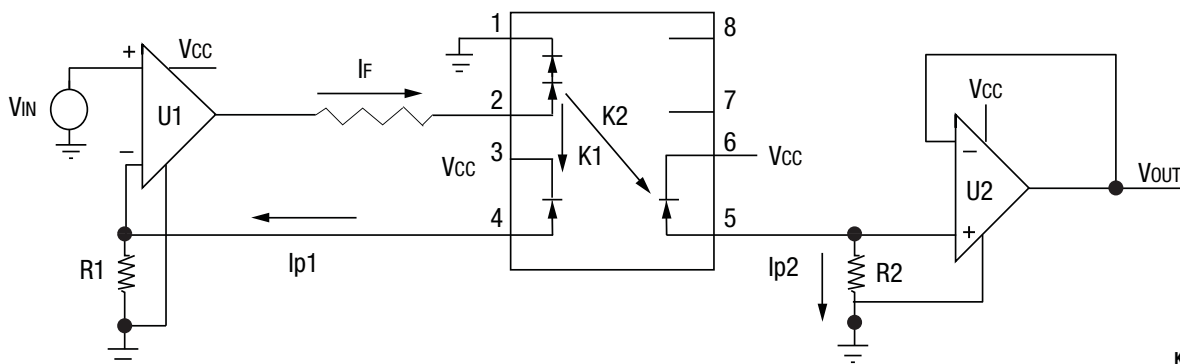
Table 2. OLH7000 Electrical Specifications (Note 1)
($T_A = 25\text{ }^\circ\text{C}$)

Parameter	Symbol	Test Condition	Minimum	Typical	Maximum	Units
LED emitter:						
Forward voltage	V_F	$I_F = 10.0\text{ mA}$		2.5	3.3	V
Reverse voltage	V_R	$I_R = 100.0\text{ }\mu\text{A}$	5.0			V
Photodiode detector:						
Dark current	I_D	$V_R = 15\text{ V}, I_F = 0\text{ mA}$		1	25	nA
Open circuit voltage	V_{OC}	$I_F = 10\text{ mA}$		500		mV
Junction capacitance	C_J	$V_F = 0\text{ V}, f = 1\text{ MHz}$		12		pF
Coupled characteristics:						
K1, Servo current gain (I_{P1}/I_F)	K1	$I_F = +10.0\text{ mA}, V_{DET} = -15.0\text{ V}$	+0.0025	+0.0100	+0.0175	
Servo current	I_{P1}	$I_F = +10.0\text{ mA}, V_{DET} = -15.0\text{ V}$		+100.0		μA
K2, Forward current gain (I_{P2}/I_F)	K2	$I_F = +10.0\text{ mA}, V_{DET} = -15.0\text{ V}$	+0.0025	+0.0100	+0.0175	
Forward current	I_{P2}	$I_F = +10.0\text{ mA}, V_{DET} = -15.0\text{ V}$		+100.0		μA
K3, Transfer gain ($K2/K1$)	K3	$I_F = +10.0\text{ mA}, V_{DET} = -15.0\text{ V}$	+0.75	+1.00	+1.25	
Frequency response (-3 dB)	BW	$I_F = +10.0\text{ mA} \pm 4.0\text{ mA}, R_L = +50.0\text{ }\Omega$		+200.0		kHz
Phase response @ 200 KHz		$I_F = +10.0\text{ mA} \pm 4.0\text{ mA}, R_L = +50.0\text{ }\Omega$		-45.0		$^\circ\text{C}$
Rise time	t_r	$I_F = +10.0\text{ mA} \pm 4.0\text{ mA}, R_L = +50.0\text{ }\Omega$		+2.0		μs
Fall time	t_f	$I_F = +10.0\text{ mA} \pm 4.0\text{ mA}, R_L = +50.0\text{ }\Omega$		+2.0		μs
Input/output capacitance	C_{I-O}	$f = +1.0\text{ MHz}$		+1.5		pF
Insulation resistance	R_{I-O}	$V_{I-O} = +500.0\text{ V}_{DC}$		+10.0		$\text{G}\Omega$
Withstand test voltage	WTV	$R_H \leq +50\%, I_{I-O} \leq +1.0\text{ }\mu\text{A}, 1\text{ s}$	+1000.0			V_{DC}

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

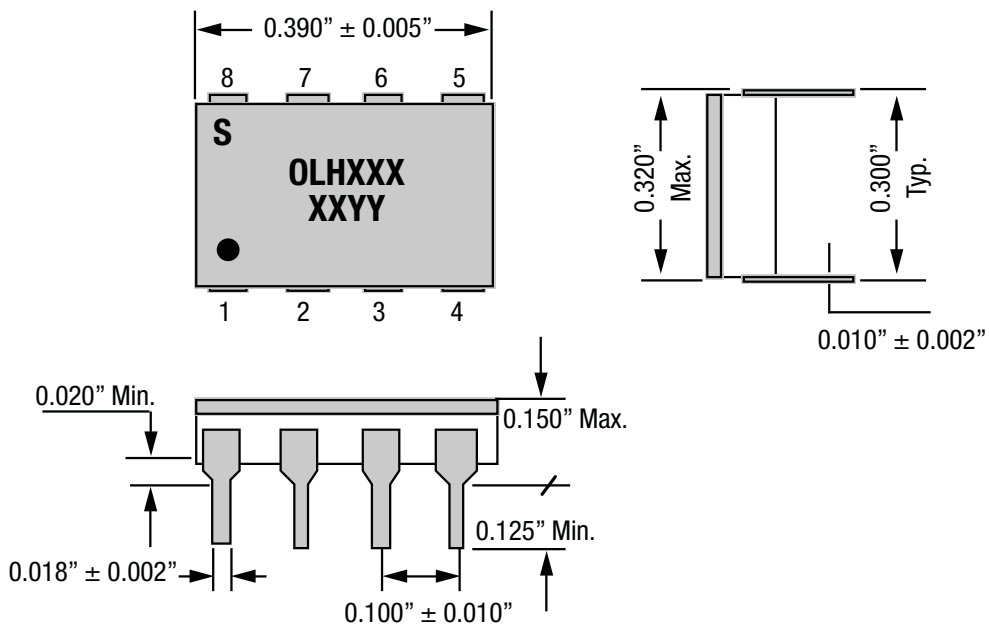
This typical application circuit uses an operational amplifier at the input side to drive the LEDs. The output photodiode is connected to a non-inverting voltage follower amplifier. The overall transfer

gain, V_O/V_{IN} , equals $(K2 * R2)/(K1 * R1)$. Because $(K2/K1) = K3$, the circuit gain becomes $K3 (R2/R1)$.



K042

Figure 2. OLH7000 Switching Test Circuit



K021

Figure 3. OLH7000 Package Dimensions

Ordering Information

Model Name	Manufacturing Part Number
OLH7000: Hermetic Linear Optocoupler	OLH7000

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