

## Description

The IBH7000 consists of input LED optically coupled to two PIN photodiode detectors in a hermetic 8-pin DIP package. The input side photodiode allows an external feedback loop to ensure constant LED light output. A matched output photodiode drives an output circuit electrically isolated from the input. A fixed relationship is thus maintained between the input and output, compensating for the LED's nonlinear, time, and temperature characteristics.

## Features

- Hermetic 8-pin DIP package
- 2000Vdc isolation voltage
- High reliability and rugged construction
- High reliability screening available
- Radiation tolerant
- DC input with matched photodiode output
- Excellent Linearity and stability
- Operating temperature range -55°C to +125°C

## Applications

- Switch mode power supplies
- Motor control
- Ground signal isolation

## Schematic Diagram

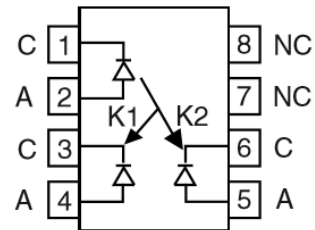


Figure 1. IBH7000 Schematic Diagram

## Package Dimensions in inches (mm)

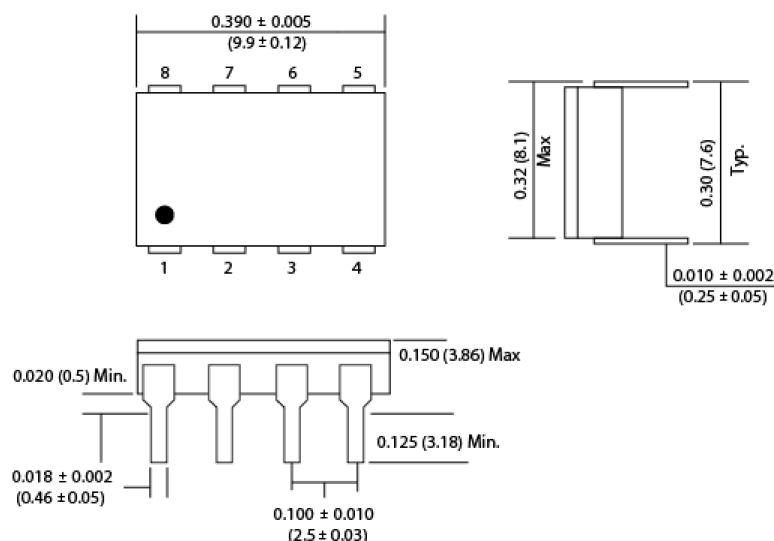


Figure 2. IBH7000 Package Dimensions

**Absolute Maximum Rating at 25°C** (Note 1)

<b>Symbol</b>	<b>Parameters</b>	<b>Ratings</b>	<b>Units</b>	<b>Notes</b>
V <sub>DC</sub>	Isolation voltage	-1000 to +1000	V	2
T <sub>OPR</sub>	Operating temperature	-55 to +125	°C	
T <sub>STG</sub>	Storage temperature	-65 to +150	°C	
T <sub>SOL</sub>	Soldering temperature (10 seconds maximum)	240	°C	
P <sub>D</sub>	Total power dissipation	250	mW	
<b>Emitter</b>				
P <sub>D</sub>	Emitter power dissipation	100	mW	
I <sub>F</sub>	Forward current	60	mA	3
I <sub>F(Peak)</sub>	Peak forward current (≤1ms duration)	100	mA	
V <sub>R</sub>	Reverse voltage	6	V	
<b>Detector</b>				
V <sub>R</sub>	Reverse Voltage	30	V	
V <sub>F</sub>	Forward Voltage	0.3	V	

**Notes**

1. When using this product, please observe the absolute maximum ratings. Only one parameter may be set at the limit to ensure no damage to the device. Exceeding any of the limits listed here may damage the device.
2. Measured between input pins 1, 2, 3, and 4 shorted together, and output pins 5, 6, 7, and 8 shorted together. T<sub>A</sub> = 25°C and duration = 1sec.
3. Linear derating factor: 0.67 mA/°C above 65°C
4. Linear derating factor: 3.0 mW/°C above 25°C

**ESD Precaution**

Please be advised that normal static precautions should be taken in the handling and assembly of this device to prevent damage or degradation which may be induced by electrostatic discharge (ESD).

**Electrical Characteristics**  $T_A = 25^\circ\text{C}$  (unless otherwise specified) (Note 1)

**Emitter Characteristics**

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$V_F$	Forward Voltage	$I_F = 10\text{mA}$	-	2.5	3.3	V	
$V_R$	Reverse Voltage	$I_R = 100\mu\text{A}$	5.0	-	-	V	

**Detector Characteristics**

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$I_D$	Dark Current	$V_R = 15\text{V}$ , $I_F = 0\text{mA}$	-	1	25	nA	
$V_{OC}$	Open Circuit Voltage	$I_F = 10\text{mA}$	-	500	-	mV	
$C_J$	Junction Capacitance	$f = 1\text{MHz}$ , $V_F = 0\text{V}_{DC}$	-	12	-	pF	2

**Transfer Characteristics**

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$K_1$	Servo Current Gain ( $I_{P1}/I_F$ )	$I_F = 10.0\text{ mA}$ , $V_{DET} = -15.0\text{ V}$	0.0025	0.0050	0.0150		
$I_{P1}$	Servo Current	$I_F = 10.0\text{ mA}$ , $V_{DET} = -15.0\text{ V}$	-	50	-	$\mu\text{A}$	
$K_2$	Forward Current Gain ( $I_{P2}/I_F$ )	$I_F = 10.0\text{ mA}$ , $V_{DET} = -15.0\text{ V}$	0.0025	0.0050	0.0150		
$I_{P2}$	Servo Current	$I_F = 10.0\text{ mA}$ , $V_{DET} = -15.0\text{ V}$	-	50	-	$\mu\text{A}$	
$K_3$	Transfer Gain ( $K_2/K_1$ )	$I_F = 10.0\text{ mA}$ , $V_{DET} = -15.0\text{ V}$	0.75	1.0	1.25		
BW	Frequency response (-3 dB)	$I_F = 10\text{mA} \pm 4\text{mA}$ , $R_L = 50\Omega$	-	200	-	kHz	
	Phase response @ 200 KHz	$I_F = 10\text{mA} \pm 4\text{mA}$ , $R_L = 50\Omega$	-	45	-	$^\circ$	
$R_{IO}$	Isolation Resistance	$V_{IO} = \pm 500\text{V}_{DC}$	-	$10^9$	-	$\Omega$	2
$C_{IO}$	Isolation Capacitance	$f = 1\text{MHz}$ , $V_{IO} = 0\text{V}_{DC}$	-	1.5	-	pF	2
WTV	Withstand Test Voltage	$RH \leq 50\%$ , $I_{IO} \leq 1.0\ \mu\text{A}$ , 1 s	1000	-	-	$V_{DC}$	

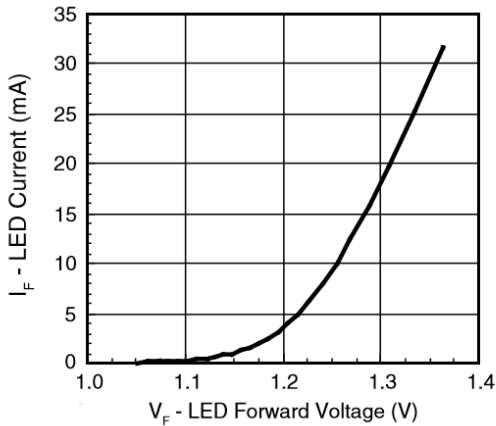
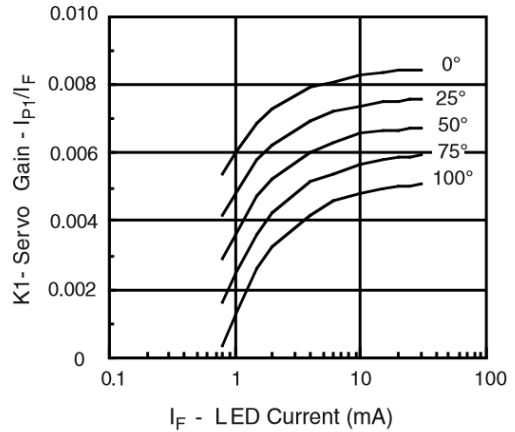
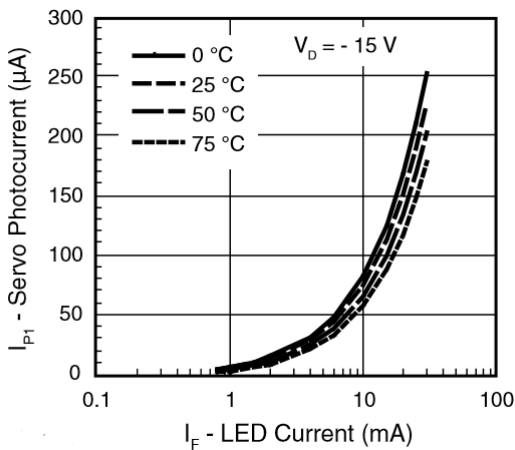
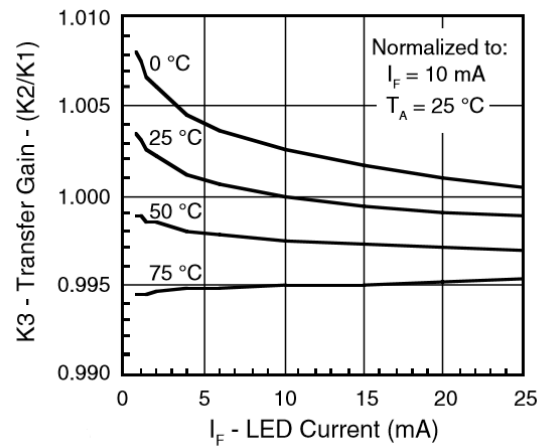
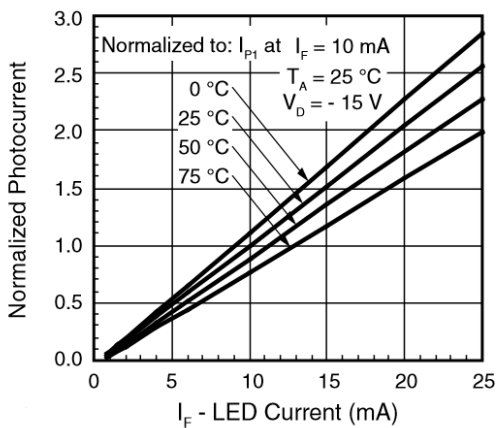
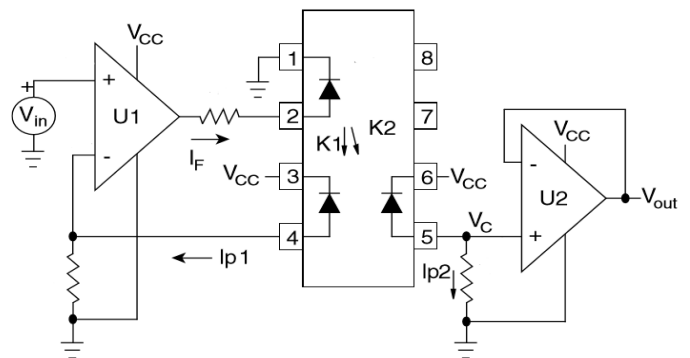
**Switching Characteristics**

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$t_r$	Rise Time	$I_F = 10\text{mA} \pm 4\text{mA}$ , $R_L = 50\Omega$	-	2	-	$\mu\text{s}$	
$t_f$	Fall Time		-	2	-		

**Notes**

- Performance guaranteed only under conditions listed in above tables.
- Measured between input pins 1, 2, 3, and 4 shorted together, and output pins 5, 6, 7, and 8 shorted together.  $T_A = 25^\circ\text{C}$  and duration = 1sec.

### Typical Characteristic Curves


**Figure 3. Forward Current vs Forward Voltage**

**Figure 4. Servo Gain vs Forward Current**

**Figure 5. Servo Photocurrent vs Forward Current**

**Figure 6. Transfer Gain Vs Forward Current**

**Figure 7. Servo Photocurrent vs Forward Current**

**Figure 8. IBH7000 Switching Test Circuit**



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## Ordering Information

<i>Manufacturing Part Number</i>	<i>Part Description</i>
IBH7000	Radiation Tolerant Hermetic 8-pin DIP Linear Optocoupler

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