

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

Description

The IBH7000 consists of input LED optically coupled to two PIN photodiode detectors in a hermetic 8-pin DIP package specifically screened and qualified for NewSpace, near earth orbit, and low earth orbit (LEO) applications. 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.

Schematic Diagram

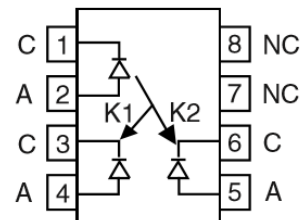


Figure 1. IBH7000.NEO Schematic Diagram

Package Dimensions in inches (mm)

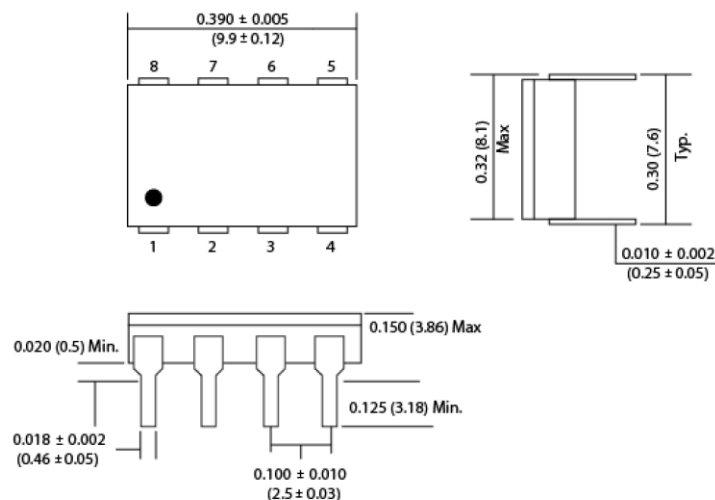


Figure 2. IBH7000.NEO Package Dimensions

Absolute Maximum Rating at 25°C (Note 1)

Symbol	Parameters	Ratings	Units	Notes
V _{DC}	Isolation voltage	-1000 to +1000	V	2
T _{OPR}	Operating temperature	-55 to +125	°C	
T _{STG}	Storage temperature	-65 to +150	°C	
T _{SOL}	Soldering temperature (10 seconds maximum)	240	°C	
P _D	Total power dissipation	250	mW	
Emitter				
P _D	Emitter power dissipation	100	mW	
I _F	Forward current	60	mA	3
I _{F(Peak)}	Peak forward current (≤1ms duration)	100	mA	
V _R	Reverse voltage	6	V	
Detector				
V _R	Reverse Voltage	30	V	
V _F	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_A = 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	-	μA	
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	-	μA	
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	-	Ω	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}	

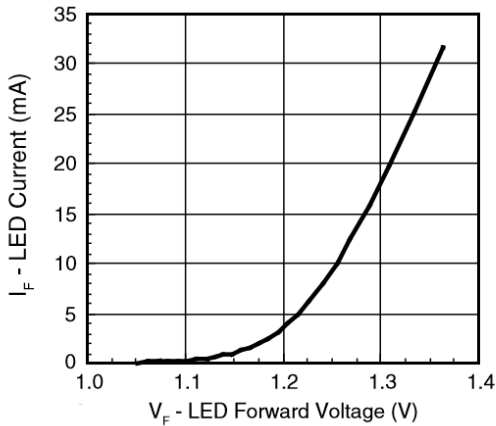
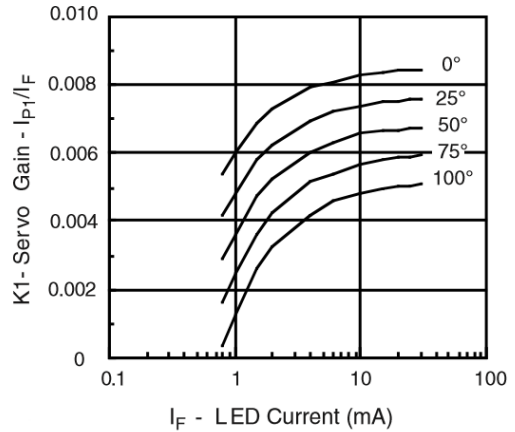
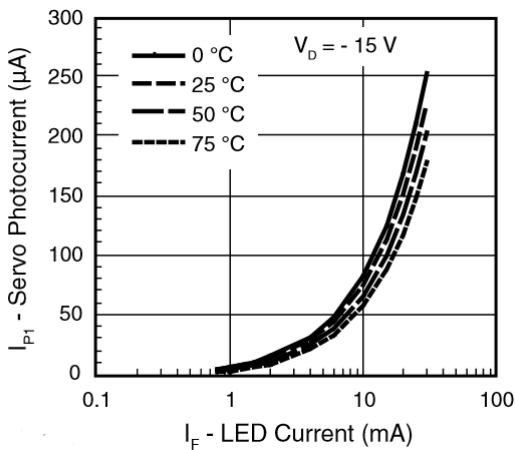
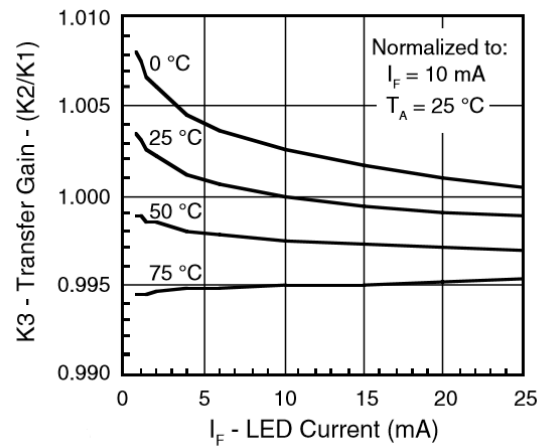
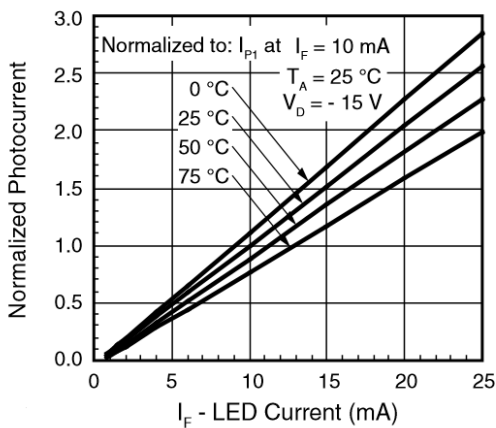
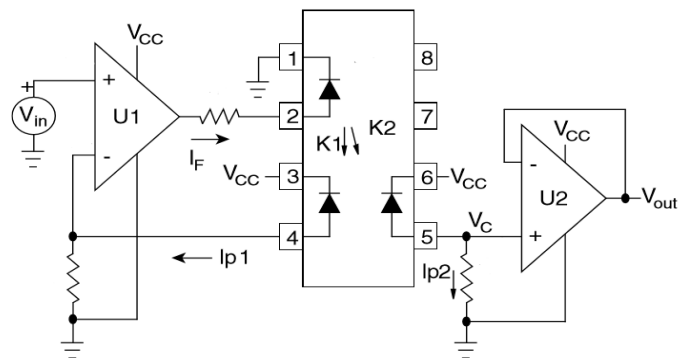
Switching Characteristics

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	-	μs	
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.NEO Switching Test Circuit

Ordering Information

Manufacturing Part Number	Part Description
IBH7000.NEO	Radiation Tolerant Hermetic 8-pin DIP Linear Optocoupler

Screening Information $T_A = 25^\circ\text{C}$ (unless otherwise specified) (Note 1)

Screening Test	Test Condition Description	Notes
Constant Acceleration	100% per MIL-STD-750 Method 2006	
Gross leak	100% per MIL-STD-750 Method 1071, Condition C	
Fine leak	100% per MIL-STD-750 Method 1071, Condition H	
Electrical test at $T_A = 25^\circ\text{C}$	100%	2, 5
Electrical test at $T_A = -55^\circ\text{C}$	Sample size based on lot size	3, 6
Electrical test at $T_A = 125^\circ\text{C}$	Sample size based on lot size	3, 6
Steady State Op Life	Per MIL STD-750 Method 1026. Sample size based on lot size	3
Radiation tolerance	Typical wafer lot data	4

Notes

1. Performance guaranteed only under conditions listed in above tables
2. Testing at 25°C guarantees full temperature operating range
3. Small Lot sample size = 12 units. Large Lot sample size = 22 units
4. Data provided upon request
5. 100% Test at $T_A = 25^\circ\text{C}$. No R&R data
6. R&R data provided on samples tested at $T_A = 25^\circ\text{C}, -55^\circ\text{C}, 125^\circ\text{C}$

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Radiation Tolerant Hermetic
Near Earth Orbit Optocoupler

IBH7000.NEO
