

## Features

- Hermetic 3-pin TO-18 package
- Wide reception angle
- High reliability and rugged construction
- High reliability screening available
- Radiation tolerant
- Operating temperature range -65°C to +125°C

## Applications

- Encoders
- Position Sensors
- Level Detection

## Description

The IB14N1 / IB14N2 consist of silicon phototransistors mounted in a wide angle hermetic TO-18 package.

## Schematic Diagram

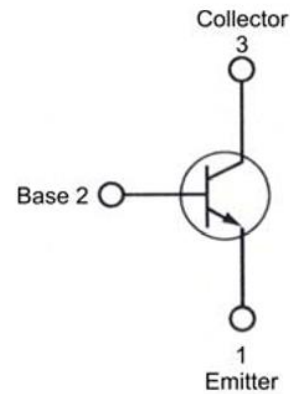


Figure 1. IB14NX Schematic Diagram

## Package Dimensions in inches (mm)

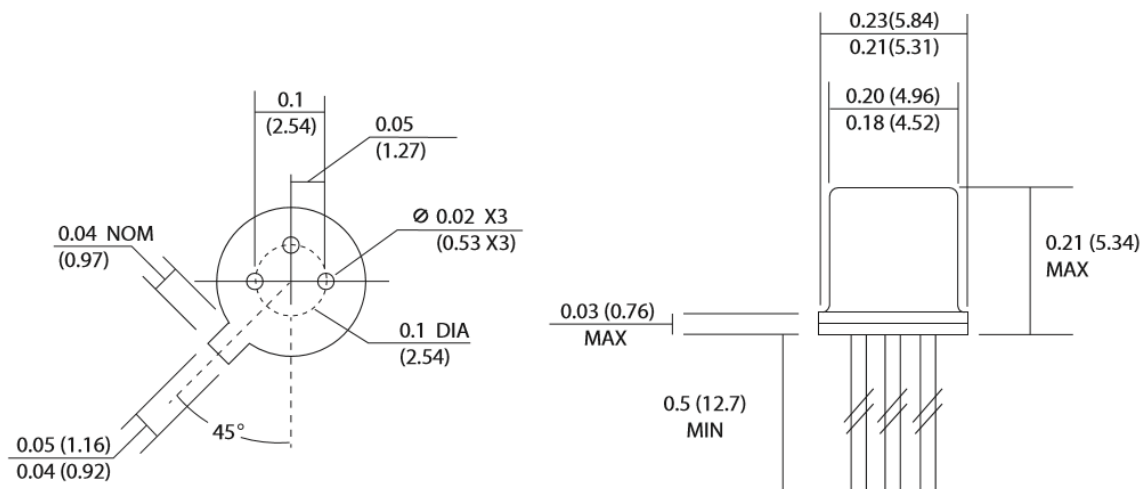


Figure 2. IB14NX Package Dimensions

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

<b>Symbol</b>	<b>Parameters</b>	<b>Ratings</b>	<b>Units</b>	<b>Notes</b>
T <sub>OPR</sub>	Operating temperature	-65 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>	Power dissipation, ambient	300	mW	2
P <sub>D</sub>	Power dissipation, case	600	mW	3
V <sub>CE</sub>	Collector-Emitter Voltage	30	V	
V <sub>EB</sub>	Emitter-Base Voltage	5	V	
V <sub>CB</sub>	Collector-Base Voltage	40	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. Linear derating factor: 3.0 mW/°C above 25°C ambient.
3. Linear derating factor: 6.0 mW/°C above 25°C case.

**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)

<b>Symbol</b>	<b>Parameters</b>	<b>Test Conditions</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Units</b>	<b>Notes</b>
$BV_{CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 10\text{mA}$ , $E_e = 0\text{mW}/\text{cm}^2$	30	-	-	V	
$BV_{CBO}$	Collector-Base Breakdown Voltage	$I_C = 100\mu\text{A}$ , $E_e = 0\text{mW}/\text{cm}^2$	40	-	-	V	
$BV_{EBO}$	Emitter-Base Breakdown Voltage	$I_E = 100\mu\text{A}$ , $E_e = 0\text{mW}/\text{cm}^2$	5	-	-	V	
$I_{C\_ON}$	Collector Current, On-state IB14N1	$V_{CE} = 5\text{V}$ , $E_e = 0.5\text{mW}/\text{cm}^2$	1	-	-	mA	2, 3
	Collector Current, On-state IB14N2	$V_{CE} = 5\text{V}$ , $E_e = 0.5\text{mW}/\text{cm}^2$	2	-	-	mA	2, 3
	Collector Current, On-state IB14N1/N2	$V_{CE} = 5\text{V}$ , $E_e = 1.5\text{mW}/\text{cm}^2$	-	5	-	mA	2, 3
$I_{CE\_OFF}$	Collector-Emitter Dark Current, Off-state	$V_{CE} = 10\text{V}$ , $E_e = 0\text{mW}/\text{cm}^2$	-	-	100	nA	
$V_{CE(SAT)}$	Saturation Voltage IB14N1	$I_C = 0.8\text{mA}$ , $E_e = 3.0\text{mW}/\text{cm}^2$	-	-	0.4	V	2, 3
	Saturation Voltage IB14N2	$I_C = 1.6\text{mA}$ , $E_e = 3.0\text{mW}/\text{cm}^2$	-	-	0.4	V	2, 3
$\Theta$	Reception Angle at $\frac{1}{2}$ Sensitivity		-	-	$\pm 40$	$^\circ$	

**Switching Characteristics**

<b>Symbol</b>	<b>Parameters</b>	<b>Test Conditions</b>	<b>Typ</b>	<b>Max</b>	<b>Units</b>	<b>Notes</b>
$t_r$	Rise Time	$I_F = 10\text{mA}$ , $V_{CC} = 5\text{V}$ , $R_L = 100\Omega$	14	-	$\mu\text{s}$	
$t_f$	Fall Time		16	-		

**Notes**

- Performance guaranteed only under conditions listed in above tables.
- Light Source is a GaAs LED emitting light at a peak wavelength of 940nm.
- Figure 3 and 4 use light source of tungsten lamp at 2870K color temperature. A GaAs source of  $3.0\text{mW}/\text{cm}^2$  is approximately equivalent to a tungsten source of 2870K of  $10\text{mW}/\text{cm}^2$ .

## Typical Characteristic Curves

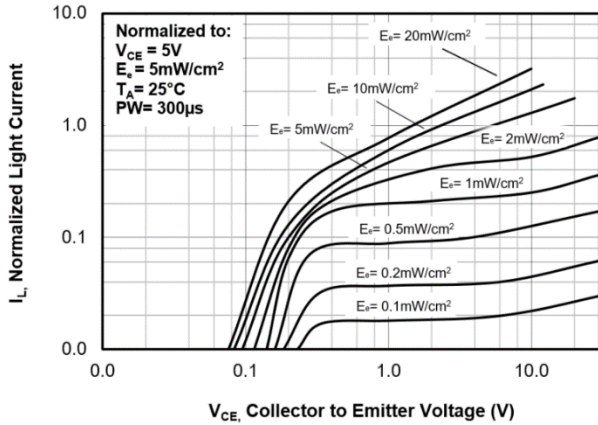


Figure 3. Light Current vs Collector-Emitter Voltage

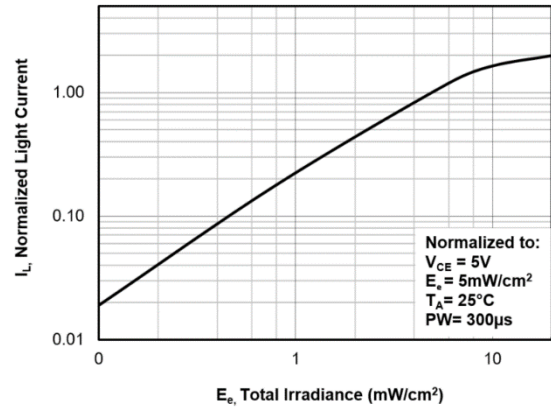


Figure 4. Normalized Light Current vs Radiation

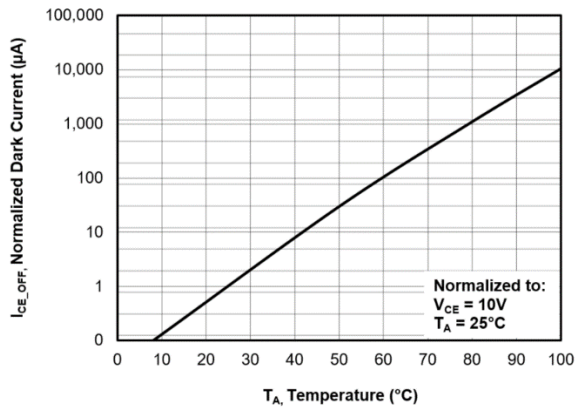


Figure 5. Dark Current vs Temperature

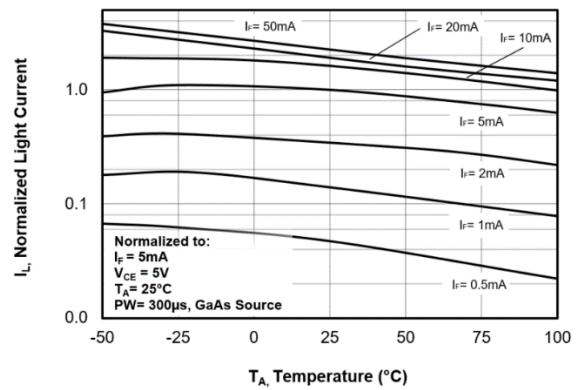


Figure 6. Light Current vs Temperature

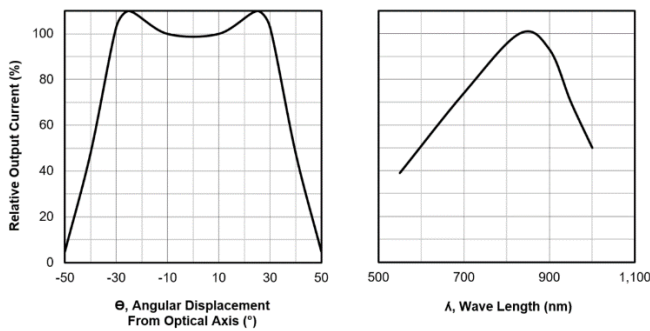


Figure 7. Angular and Spectral Response

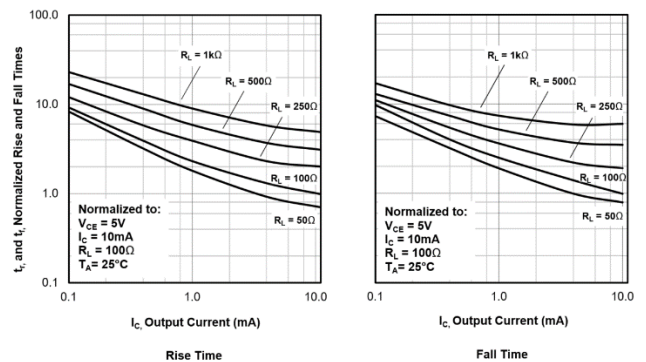


Figure 8. Switching Speed vs Output Current



## Ordering Information

<i>Manufacturing Part Number</i>	<i>Part Description</i>
IB14N1	Radiation Tolerant Hermetic Silicon Phototransistor 3-pin TO-18 Package
IB14N2	Radiation Tolerant Hermetic Silicon Phototransistor 3-pin TO-18 Package

## DISCLAIMER

Isobaud Inc. reserves the right to make changes without further notice to any products herein to improve reliability, function or design. Isobaud Inc. does not assume any liability arising out of the application or use of any product or circuit described herein; neither does it convey any license under its patent rights, nor the rights of others.