# Radiation Tolerant Phototransistor Hermetic Surface Mount Optocoupler

**IBS049**

## Features

- Hermetic 4-pin LCC package
- 1000Vdc isolation voltage
- High CTR
- Small Outline package
- High reliability and rugged construction
- High reliability screening available
- Radiation tolerant
- DC input with transistor output
- Operating temperature range -55℃ to +125℃

## Applications

- Switch mode power supplies
- Computer peripheral interface
- Motor control
- Ground signal isolation

## Description

The IBS049 consists of a phototransistor optically coupled to an AlGaAs infrared-emitting diode in a leadless hermetic surface mount package.

## Schematic Diagram

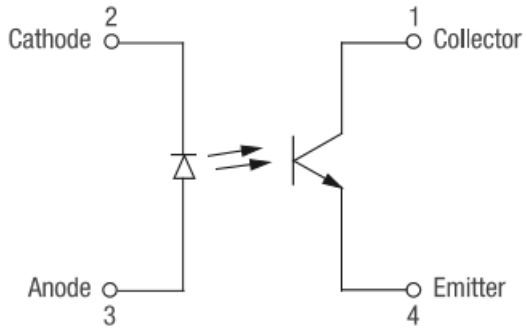


**Figure 1. IBS049 Schematic Diagram**

## Package Dimensions in inches (mm)

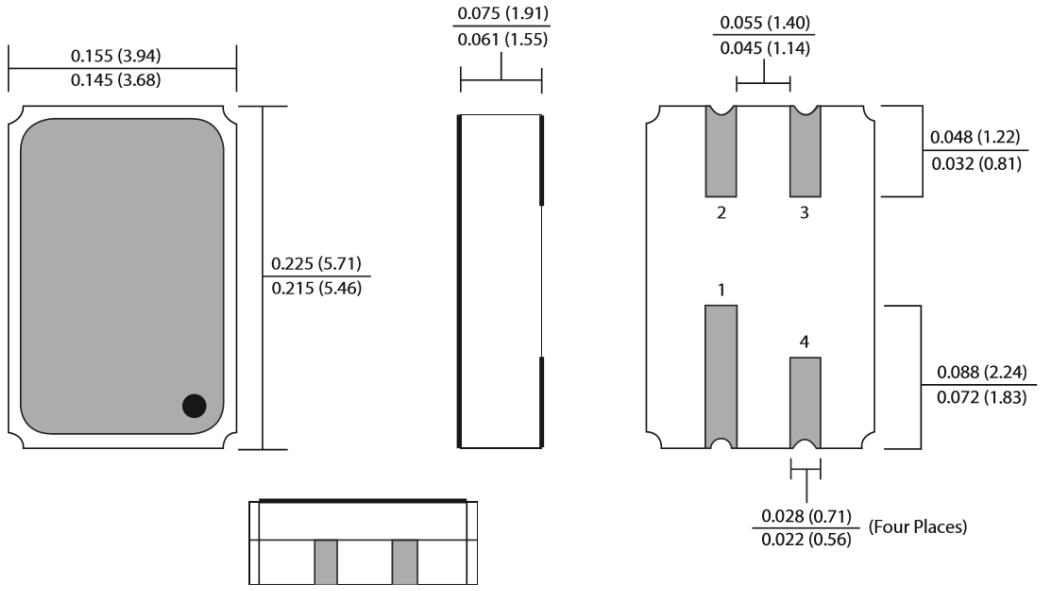


**Figure 2. IBS049 Package Dimensions**

## 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 | |
| **Emitter** | | | | |
| $P_D$ | Emitter power dissipation | 60 | mW | 3 |
| $I_F$ | Forward current | 40 | mA | |
| $I_{F(TRANS)}$ | Peak transient current (≤1μs P.W.,300pps) | 1 | A | |
| $V_R$ | Reverse voltage | 2 | V | |
| **Detector** | | | | |
| $P_D$ | Detector power dissipation | 300 | mW | 4 |
| $V_{CE}$ | Collector-Emitter Voltage | 60 | V | |
| $V_{EC}$ | Emitter-Collector Voltage | 5 | V | |
| $I_{CC}$ | Continuous Collector Current | 50 | mA | |

### 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, and 4 shorted together, and output pins 2 and 3 shorted together. $T_A$ = 25°C and duration = 1sec.
3. Linear derating factor: 1.0 mW/°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℃ *(unless otherwise specified)* (Note 1)

### Emitter Characteristics

| *Symbol* | *Parameters* | *Test Conditions* | *Min* | *Max* | *Units* | *Notes* |
|---|---|---|---|---|---|---|
| $V_F$ | Forward Voltage | $I_F$=10mA, $T_A$ = -55°C | 1.4 | 2.0 | V | |
| | | $I_F$=10mA | 1.2 | 1.8 | V | |
| | | $I_F$=10mA, $T_A$ = 100°C | 1.1 | 1.7 | V | |
| $I_R$ | Reverse Current | $V_R$ = 2V | - | 100 | µA | |

### Detector Characteristics

| *Symbol* | *Parameters* | *Test Conditions* | *Min* | *Max* | *Units* | *Notes* |
|---|---|---|---|---|---|---|
| $BV_{CEO}$ | Collector-Emitter Breakdown Voltage | $I_{CE}$= 1mA | 60 | - | V | |
| $BV_{ECO}$ | Emitter-Collector Breakdown Voltage | $I_{EB}$= 100µA | 5 | - | V | |
| $I_{C\_ON}$ | Collector Current, On-state | $V_{CE}$= 5V, $I_F$=1mA | 2 | 12 | mA | |
| | | $V_{CE}$= 5V, $I_F$=2mA, $T_A$= -55°C | 2.8 | - | mA | |
| | | $V_{CE}$= 5V, $I_F$=2mA, $T_A$= 100°C | 2 | - | mA | |
| $I_{CE\_OFF}$ | Collector-Emitter Dark Current, Off-state | $V_{CE}$= 20V | - | 100 | nA | |
| | | $V_{CE}$= 20V, $T_A$= 100°C | - | 100 | µA | |

### Transfer Characteristics

| *Symbol* | *Parameters* | *Test Conditions* | *Min* | *Max* | *Units* | *Notes* |
|---|---|---|---|---|---|---|
| $V_{CE(SAT)}$ | Collector-Emitter Saturation Voltage | $I_F$= 2mA, $I_C$= 2mA | - | 0.3 | V | |
| $R_{IO}$ | Isolation Resistance | $V_{IO}$= ±1000$V_{DC}$ | $10^{11}$ | - | Ω | 2 |
| $C_{IO}$ | Isolation Capacitance | f= 1MHz, $V_{IO}$= 0$V_{DC}$ | - | 5 | pF | 2 |

### Switching Characteristics

| *Symbol* | *Parameters* | *Test Conditions* | *Min* | *Max* | *Units* | *Notes* |
|---|---|---|---|---|---|---|
| $t_r$ | Rise Time | $I_F$= 10mA, $V_{CC}$= 10V, $R_L$= 100Ω | - | 25 | µs | |
| $t_f$ | Fall Time | | - | 25 | | |

### Notes

1. Performance guaranteed only under conditions listed in above tables.
2. Measured between input pins 1, and 4 shorted together, and output pins 2 and 3 shorted together. $T_A$ = 25°C and duration = 1sec.

## Typical Characteristic Curves

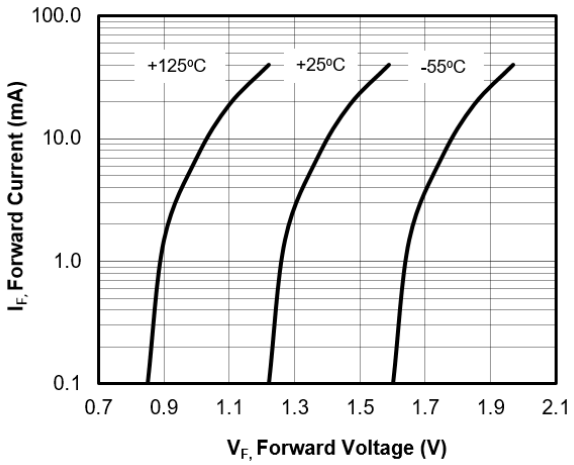


**Figure 3. Forward Current vs Forward Voltage**

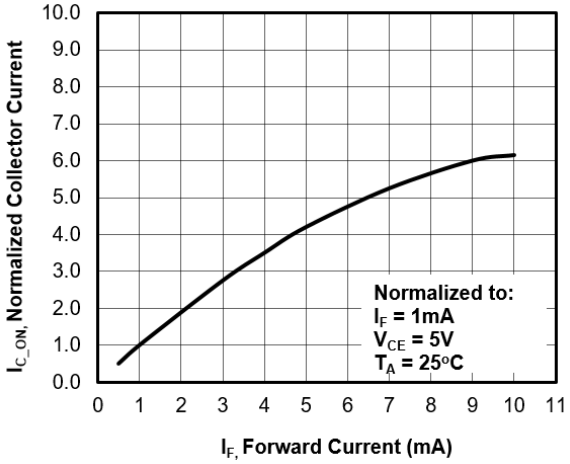


**Figure 4. Collector Current vs Forward Current**

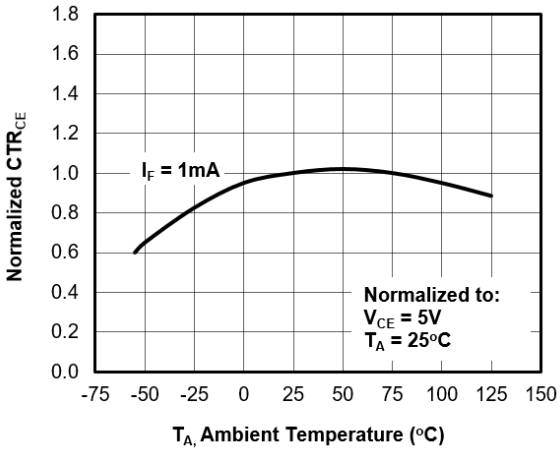


**Figure 5. Normalized $CTR_{CE}$ vs Temperature**

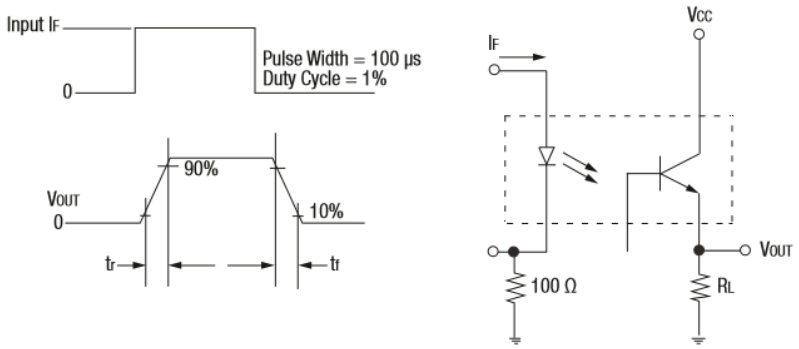


**Figure 6. IBS049 Switching Test Circuit**

## Ordering Information

| *Manufacturing Part Number* | *Part Description* |
|---|---|
| IBS049 | Radiation Tolerant Phototransistor Hermetic 4-pin LCC Package |

## DISCLAIMER