

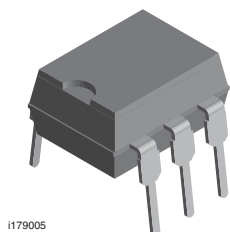


www.vishay.com

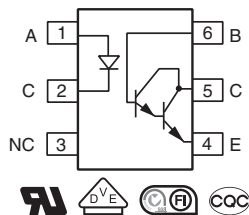
**H11B1, H11B2, H11B3**

Vishay Semiconductors

## Optocoupler, Photodarlington Output, High Gain, With Base Connection



i179005

**FEATURES**

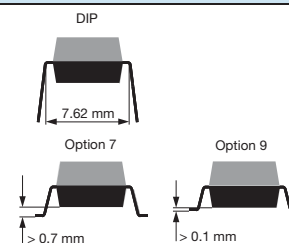
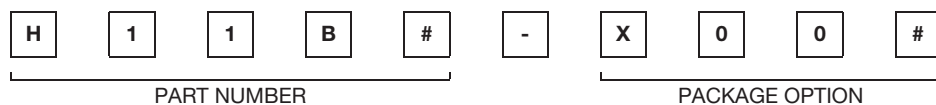
- Isolation test voltage: 4420 V<sub>RMS</sub>
- Coupling capacitance, 0.5 pF
- Material categorization:  
for definitions of compliance please see  
[www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

RoHS  
COMPLIANT**AGENCY APPROVALS**

- UL1577, file no. E52744
- cUL tested to CSA 22.2 bulletin 5A
- DIN EN 60747-5-5 (VDE 0884-5) available with option 1
- FIMKO EN60065, EN60950-1
- CQC: GB8898-2011, GB4943.1-2011

**DESCRIPTION**

The H11B1, H11B2, H11B3 are industry standard optocouplers, consisting of a gallium arsenide infrared LED and a silicon photodarlington.

**ORDERING INFORMATION**

AGENCY CERTIFIED/PACKAGE	CTR (%)		
	<b>UL, FIMKO, CQC</b>	<b>&gt; 500</b>	<b>&gt; 200</b>
DIP-6	H11B1	H11B2	H11B3
SMD-6, option 7	H11B1-X007T <sup>(1)</sup>	-	-
SMD-6, option 9	H11B1-X009	H11B2-X009T <sup>(1)</sup>	-
<b>UL, FIMKO, CQC, VDE</b>	<b>&gt; 500</b>	<b>&gt; 200</b>	<b>&gt; 100</b>
SMD-6, option 7	H11B1-X017	-	-

**Notes**

- Additional options may be possible, please contact sales office.
- <sup>(1)</sup> Also available in tubes, no "T" in the end.

**ABSOLUTE MAXIMUM RATINGS** (T<sub>amb</sub> = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		V <sub>R</sub>	3	V
Forward continuous current		I <sub>F</sub>	60	mA
Power dissipation		P <sub>diss</sub>	100	mW
Derate linearly from 25 °C			1.33	mW/°C
<b>OUTPUT</b>				
Collector emitter breakdown voltage		BV <sub>CEO</sub>	25	V
Emitter collector breakdown voltage		BV <sub>ECO</sub>	7	V
Collector base breakdown voltage		BV <sub>CBO</sub>	30	V
Collector current (continuous)		I <sub>C</sub>	100	mA
Power dissipation		P <sub>diss</sub>	150	mW
Derate linearly from 25 °C			2	mW/°C



ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>COUPLER</b>				
Total package dissipation (LED plus detector)		$P_{tot}$	260	mW
Derate linearly from 25 °C			3.5	mW/°C
Storage temperature		$T_{stg}$	-55 to +150	°C
Operating temperature		$T_{amb}$	-55 to +100	°C
Lead soldering time at 260 °C			10	s

**Note**

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability

ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>							
Forward voltage	$I_F = 50\text{ mA}$	H11B1	$V_F$	-	1.1	1.5	V
		H11B2	$V_F$	-	1.1	1.5	V
	$I_F = 10\text{ mA}$	H11B3	$V_F$	-	1.1	1.5	V
Reverse current	$V_R = 3\text{ V}$		$I_R$	-	-	10	$\mu\text{A}$
Junction capacitance	$V_F = 0\text{ V}$ , $f = 1\text{ MHz}$		$C_j$	-	50	-	pF
<b>OUTPUT</b>							
Collector emitter breakdown voltage	$I_C = 1\text{ mA}$ , $I_F = 0\text{ mA}$		$BV_{CEO}$	30	-	-	V
Emitter collector breakdown voltage	$I_E = 100\mu\text{A}$ , $I_F = 0\text{ mA}$		$BV_{ECO}$	7	-	-	V
Collector base breakdown voltage	$I_C = 100\mu\text{A}$ , $I_F = 0\text{ mA}$		$BV_{CBO}$	30	-	-	V
Collector emitter leakage current	$V_{CE} = 10\text{ V}$ , $I_F = 0\text{ mA}$		$I_{CEO}$	-	-	100	nA
<b>COUPLER</b>							
Saturation voltage collector-emitter	$I_F = 1\text{ mA}$ , $I_C = 1\text{ mA}$		$V_{CEsat}$	-	-	1	V
Capacitance (input to output)			$C_{IO}$	-	0.5	-	pF

**Note**

- Minimum and maximum values were tested requirements. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information only and are not part of the testing requirements

CURRENT TRANSFER RATIO ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
DC current transfer ratio	$V_{CE} = 5\text{ V}$ , $I_F = 1\text{ mA}$	H11B1	$CTR_{DC}$	500			%
		H11B2	$CTR_{DC}$	200			%
		H11B3	$CTR_{DC}$	100			%

SWITCHING CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT	
Switching times	$I_F = 5\text{ mA}$ , $V_{CE} = 10\text{ V}$ , $R_L = 100\ \Omega$	$t_{on}$		5		$\mu\text{s}$	
		$t_{off}$		30		$\mu\text{s}$	



SAFETY AND INSULATION RATINGS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	According to IEC 68 part 1		55 / 100 / 21	
Comparative tracking index		CTI	175	
Maximum rated withstanding isolation voltage	t = 1 min	$V_{ISO}$	4420	$V_{RMS}$
Maximum transient isolation voltage		$V_{IOTM}$	10 000	$V_{peak}$
Maximum repetitive peak isolation voltage		$V_{IORM}$	890	$V_{peak}$
Isolation resistance	$V_{IO} = 500\text{ V}, T_{amb} = 25\text{ }^{\circ}\text{C}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$V_{IO} = 500\text{ V}, T_{amb} = 100\text{ }^{\circ}\text{C}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
Output safety power		$P_{SO}$	400	mW
Input safety current		$I_{SI}$	275	mA
Safety temperature		$T_S$	175	$^{\circ}\text{C}$
Creepage distance			$\geq 7$	mm
Clearance distance			$\geq 7$	mm
Insulation thickness		DTI	$\geq 0.4$	mm

**Note**

- As per IEC 60747-5-5, § 7.4.3.8.2, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits

**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

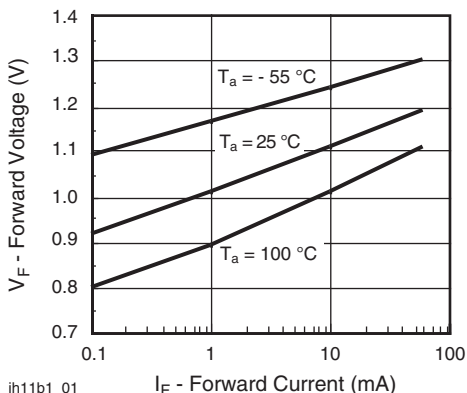


Fig. 1 - Forward Voltage vs. Forward Current

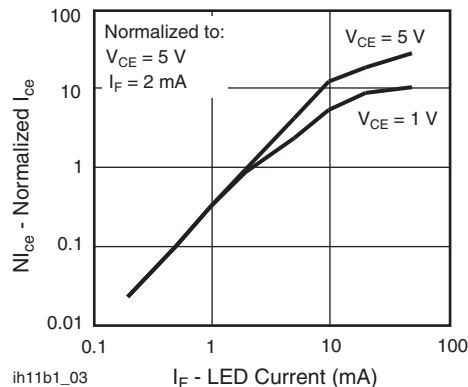


Fig. 3 - Normalized Non-Saturated and Saturated  $I_{CE}$  vs. LED Current

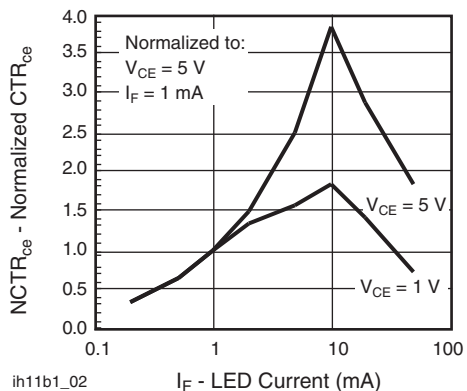


Fig. 2 - Normalized Non-Saturated and Saturated  $CTR_{CE}$  vs. LED Current

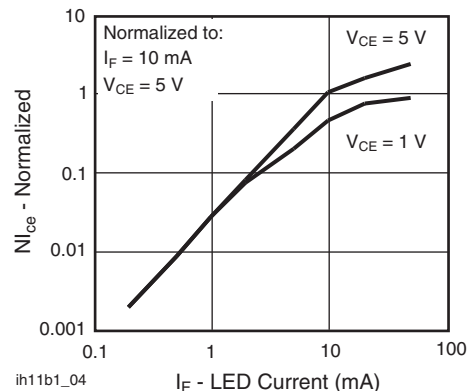


Fig. 4 - Normalized Non-Saturated and Saturated Collector Emitter Current vs. LED Current

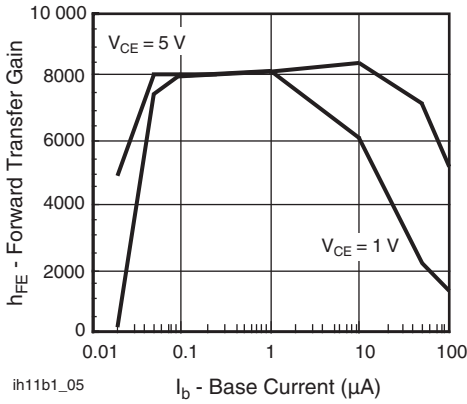


Fig. 5 - Non-Saturated and Saturated  $h_{FE}$  vs. Base Current

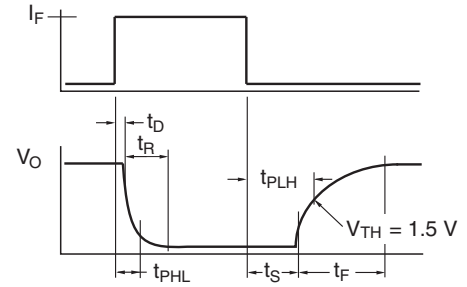


Fig. 8 - Switching Waveform

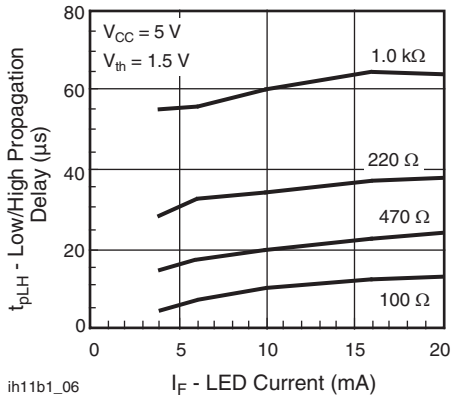


Fig. 6 - Low to High Propagation Delay vs. Collector Load Resistance and LED Current

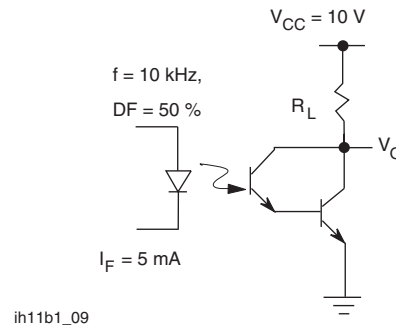


Fig. 9 - Switching Schematic

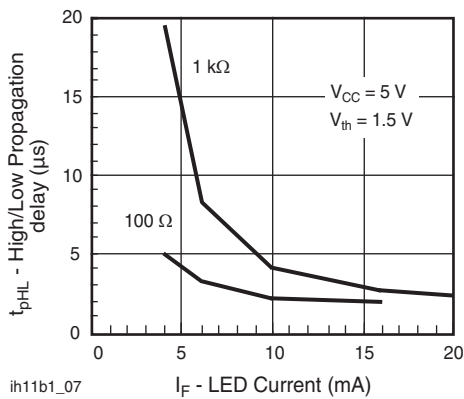
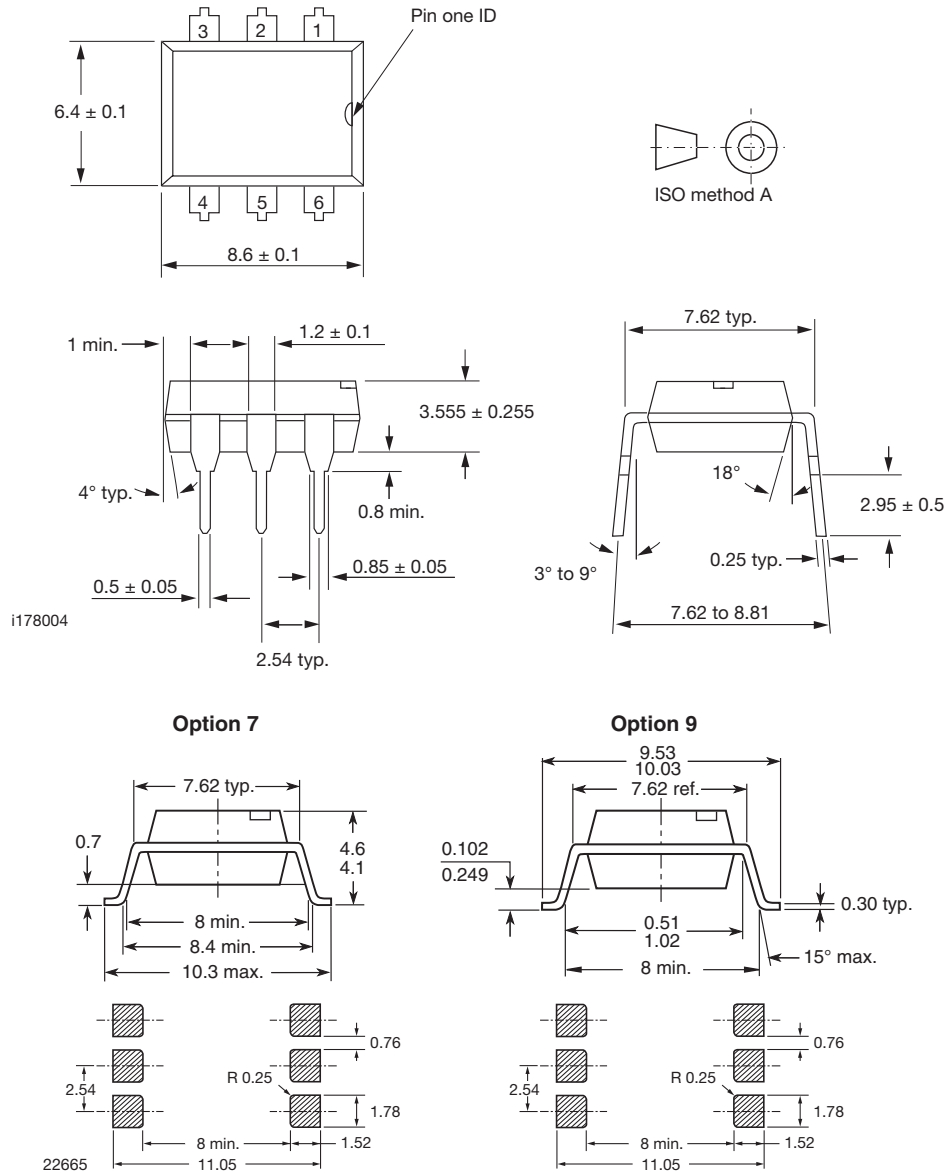


Fig. 7 - High to Low Propagation Delay vs. Collector Load Resistance and LED Current



**PACKAGE DIMENSIONS** in millimeters



**PACKAGE MARKING** (example)



**Notes**

- Only options 1, 7, and 9 are reflected in the package marking
- The VDE logo is only marked on option 1 parts
- Tape and reel suffix (T) is not part of the package marking



## **Disclaimer**

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.