

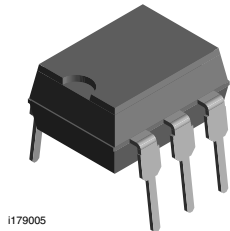


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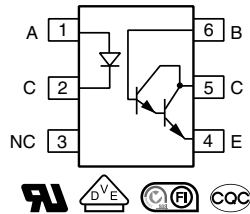
**H11B1, H11B2, H11B3**

Vishay Semiconductors

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



i179005

**FEATURES**

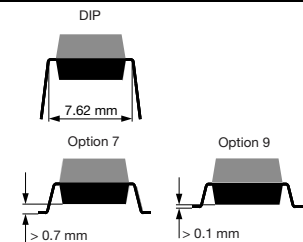
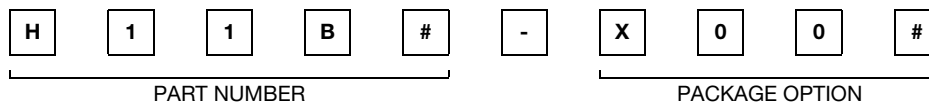
- Isolation test voltage: 4420 V<sub>RMS</sub>
- Coupling capacitance, 0.5 pF
- Material categorization:  
for definitions of compliance please see  
[www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

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>	<b>&gt; 100</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	$V_{IO} = 500 V, T_{amb} = 25\text{ }^{\circ}C$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$V_{IO} = 500 V, T_{amb} = 100\text{ }^{\circ}C$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
Output safety power		$P_{SO}$	400	mW
Input safety current		$I_{SI}$	275	mA
Safety temperature		$T_S$	175	$^{\circ}C$
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** ( $T_{amb} = 25\text{ }^{\circ}C$ , unless otherwise specified)

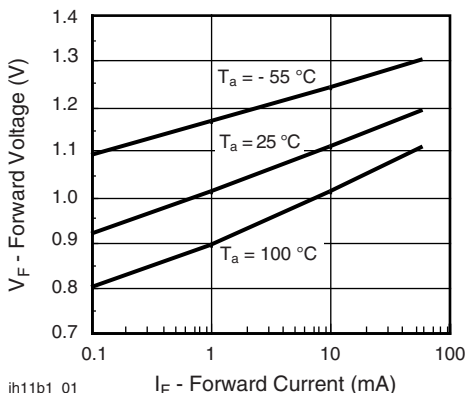


Fig. 1 - Forward Voltage vs. Forward Current

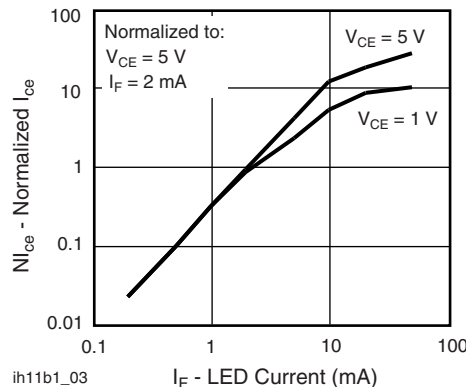


Fig. 3 - Normalized Non-Saturated and Saturated  $I_{CE}$  vs. LED Current

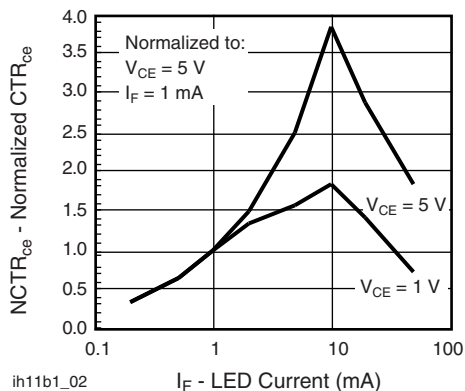


Fig. 2 - Normalized Non-Saturated and Saturated  $CTR_{CE}$  vs. LED Current

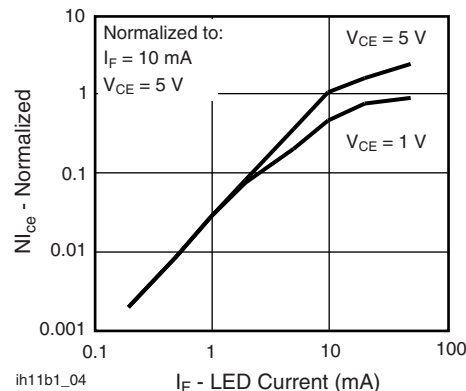


Fig. 4 - Normalized Non-Saturated and Saturated Collector Emitter Current vs. LED Current

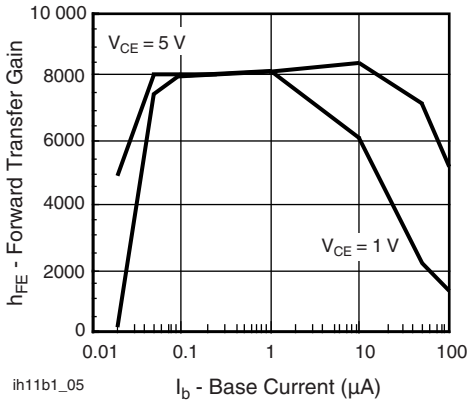


Fig. 5 - Non-Saturated and Saturated  $h_{FE}$  vs. Base Current

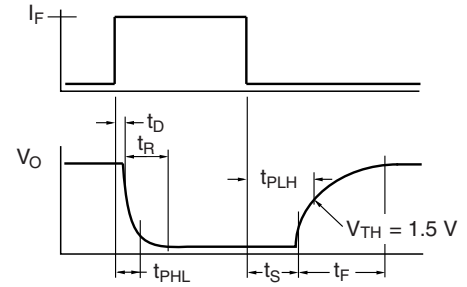


Fig. 8 - Switching Waveform

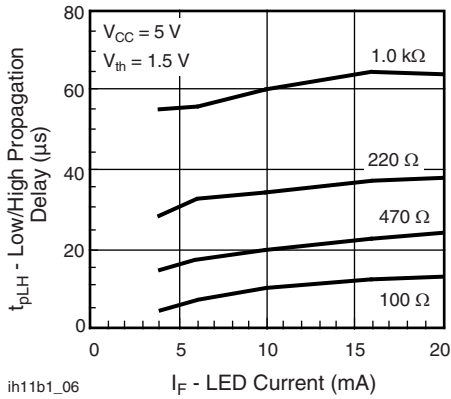


Fig. 6 - Low to High Propagation Delay vs. Collector Load Resistance and LED Current

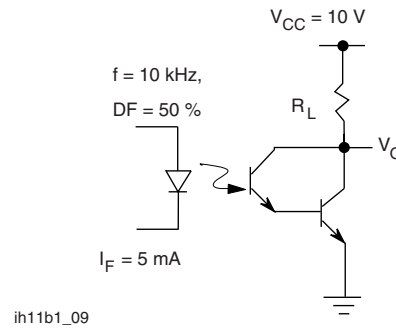


Fig. 9 - Switching Schematic

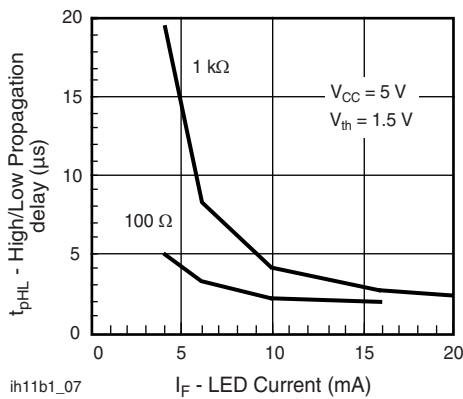
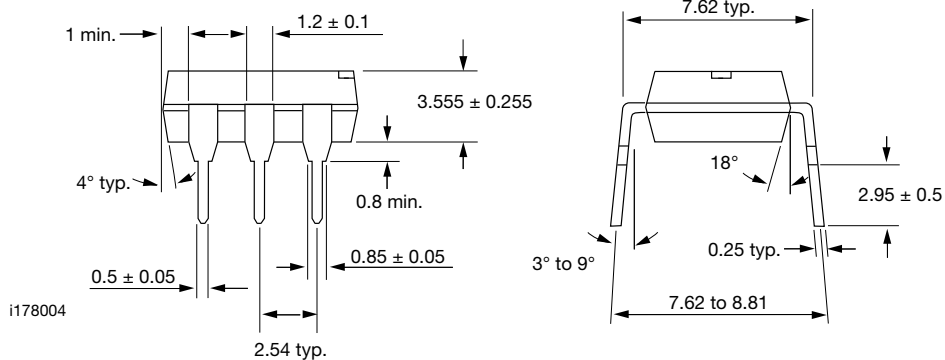
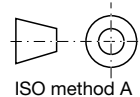
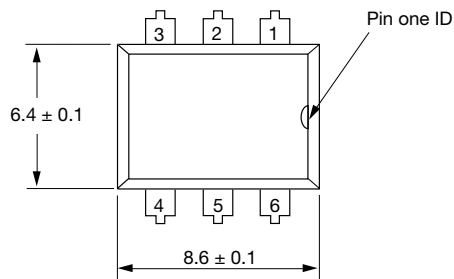


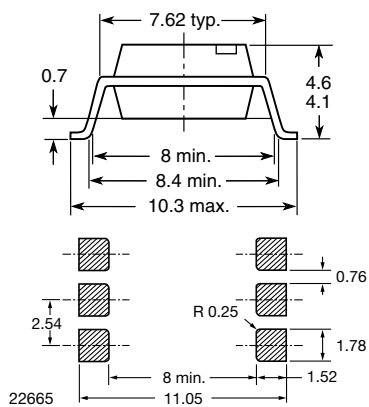
Fig. 7 - High to Low Propagation Delay vs. Collector Load Resistance and LED Current



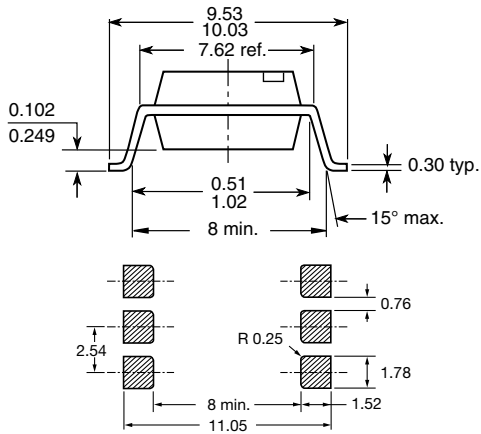
**PACKAGE DIMENSIONS** in millimeters



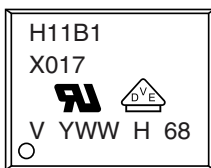
**Option 7**



**Option 9**



**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



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