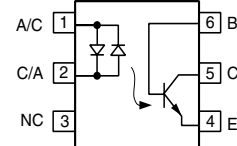
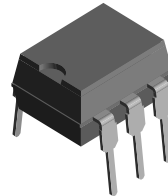


## Optocoupler, Phototransistor Output, AC input, With Base Connection

### Features

- AC or Polarity Insensitive Input
- Built-in Reverse Polarity Input Protection
- I/O Compatible with Integrated Circuits
- Industry Standard DIP Package
- Isolation Test Voltage 5300 V<sub>RMS</sub>
- Lead-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC



1179010



### Agency Approvals

- UL1577, File No. E52744 System Code H or J, Double Protection
- CSA 93751
- BSI IEC60950 IEC60065
- DIN EN 60747-5-2 (VDE0884)  
DIN EN 60747-5-5 pending  
Available with Option 1
- FIMKO

### Applications

Telephone line detection  
AC line motor  
PLC  
Instrumentation

### Description

The H11AA1 is a bi-directional input optically coupled isolator consisting of two inverse parallel Gallium Arsenide infrared LEDs coupled to a silicon NPN phototransistor in a 6-pin DIP package. The H11AA1 has a minimum CTR of 20 %, a CTR symmetry of 1:3 and is designed for applications requiring detection or monitoring of AC signals.

### Order Information

Part	Remarks
H11AA1	CTR > 20 %, DIP-6
H11AA1-X006	CTR > 20 %, DIP-6 400 mil (option 6)
H11AA1-X007	CTR > 20 %, SMD-6 (option 7)
H11AA1-X009	CTR > 20 %, SMD-6 (option 9)

For additional information on the available options refer to Option Information.

### Absolute Maximum Ratings

T<sub>amb</sub> = 25 °C, unless otherwise specified

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 Rating for extended periods of the time can adversely affect reliability.

### Input

Parameter	Test condition	Symbol	Value	Unit
Forward continuous current		I <sub>F</sub>	60	mA
Power dissipation		P <sub>diss</sub>	100	mW
Derate linearly from 25 °C			1.3	mW/°C

### Output

Parameter	Test condition	Symbol	Value	Unit
Power dissipation		$P_{diss}$	200	mW
Derate linearly from 25 °C			2.6	mW/°C
Collector-emitter breakdown voltage		$BV_{CEO}$	30	V
Emitter-base breakdown voltage		$BV_{EBO}$	5.0	V
Collector-base breakdown voltage		$BV_{CBO}$	70	V

### Coupler

Parameter	Test condition	Symbol	Value	Unit
Isolation test voltage (between emitter and detector)	Referred to standard climate 23 °C/50%RH, DIN 50014	$V_{ISO}$	5300	$V_{RMS}$
Creeepage			≥ 7.0	mm
Clearance			≥ 7.0	mm
Comparative tracking index per DIN IEC 112/VDE 0303, part 1			175	
Isolation resistance	$V_{IO} = 500\text{ V}, T_{amb} = 25\text{ °C}$	$R_{IO}$	≥ $10^{12}$	Ω
	$V_{IO} = 500\text{ V}, T_{amb} = 100\text{ °C}$	$R_{IO}$	≥ $10^{11}$	Ω
Storage temperature		$T_{stg}$	- 55 to + 150	°C
Operating temperature		$T_{amb}$	- 55 to + 100	°C
Lead soldering time at 260 °C		$T_{sld}$	10	sec.

### Electrical Characteristics

$T_{amb} = 25\text{ °C}$ , unless otherwise specified

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

### Input

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Forward voltage	$I_F = \pm 10\text{ mA}$	$V_F$		1.2	1.5	V

### Output

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Collector-emitter breakdown voltage	$I_C = 1.0\text{ mA}$	$BV_{CEO}$	30			V
Emitter-base breakdown voltage	$I_E = 100\text{ }\mu\text{A}$	$BV_{EBO}$	5.0			V
Collector-base breakdown voltage	$I_C = 100\text{ }\mu\text{A}$	$BV_{CBO}$	70			V
Collector-emitter leakage current	$V_{CE} = 10\text{ V}$	$I_{CEO}$		5.0	100	nA

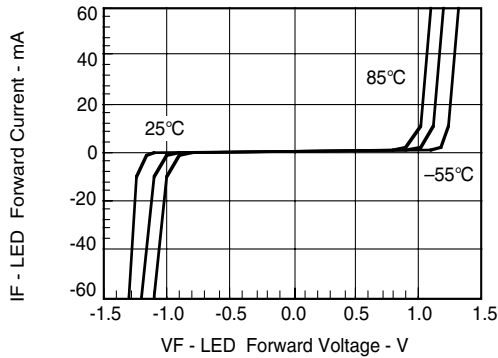
### Coupler

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Collector-emitter saturation voltage	$I_F = \pm 10\text{ mA},$ $I_C = 0.5\text{ mA}$	$V_{CEsat}$			0.4	V

## Current Transfer Ratio

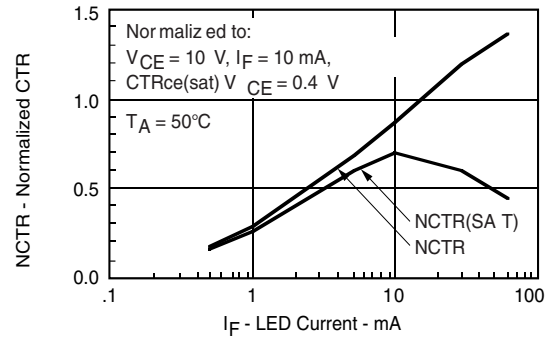
Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
DC Current Transfer Ratio	$I_F = \pm 10 \text{ mA}$ , $V_{CE} = 10 \text{ V}$	$CTR_{DC}$	20			%
Symmetry (CTR at + 10 mA) / (CTR at - 10 mA)			0.33	1.0	3.0	

## Typical Characteristics ( $T_{amb} = 25^\circ\text{C}$ unless otherwise specified)



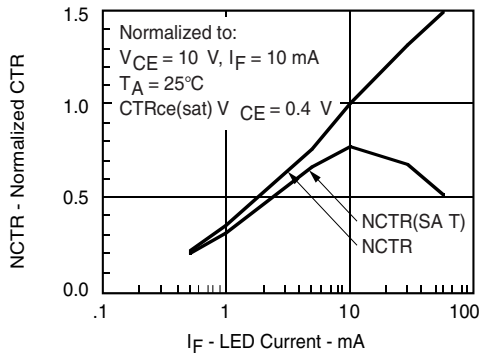
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Figure 1. LED Forward Current vs. Forward Voltage



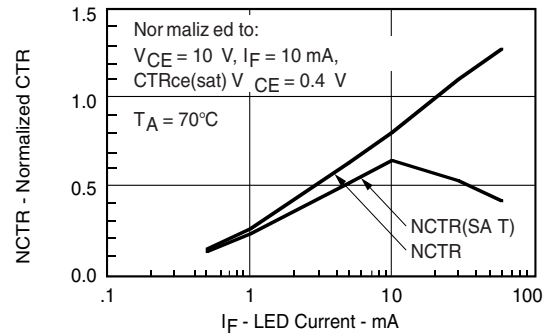
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Figure 3. Normalized Non-saturated and Saturated CTR vs. LED Current



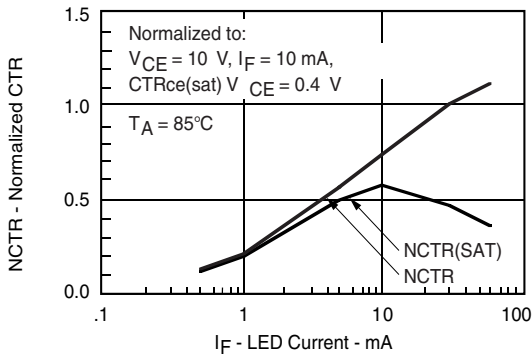
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Figure 2. Normalized Non-Saturated and Saturated CTR vs. LED Current



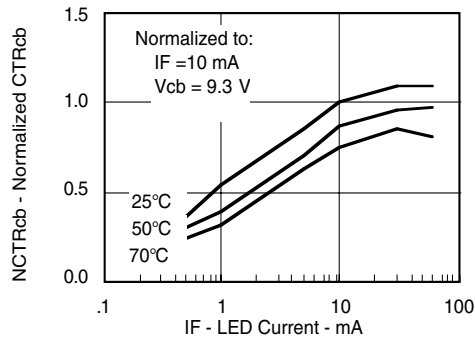
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Figure 4. Normalized Non-saturated and saturated CTR vs. LED Current



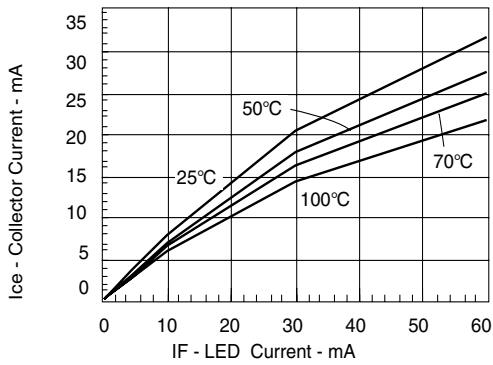
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Figure 5. Normalized Non-saturated and saturated CTR vs. LED Current



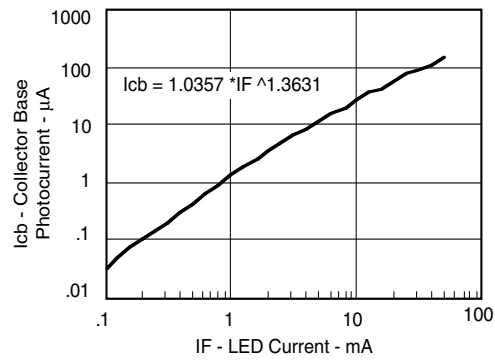
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Figure 8. Normalized CTRcb vs. LED Current and Temp.



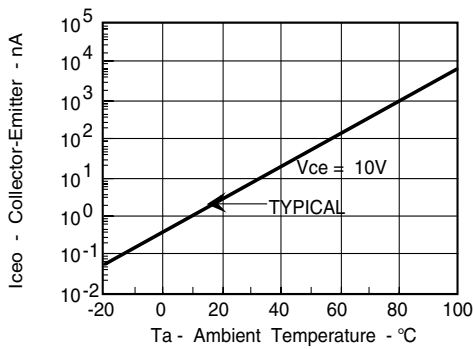
ih11aa1\_06

Figure 6. Collector-Emitter Current vs. Temperature and LED Current



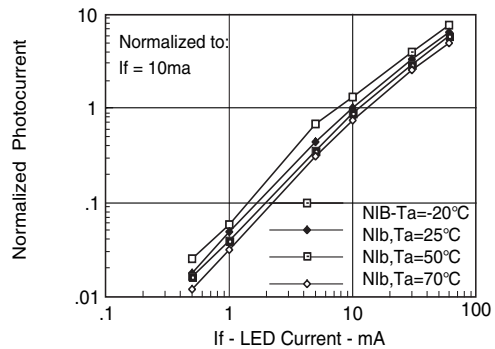
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Figure 9. Collector-Base Photocurrent vs. LED Current



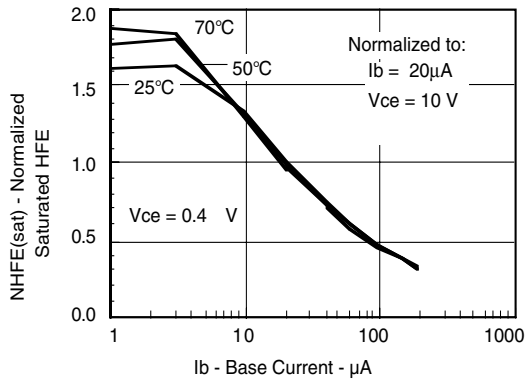
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Figure 7. Collector-Emitter Leakage Current vs. Temp.



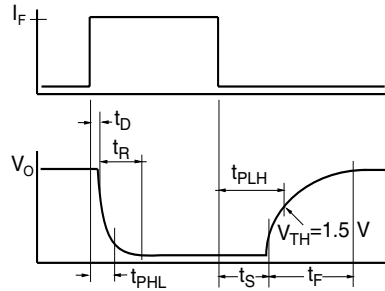
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Figure 10. Normalized Photocurrent vs. LED Current



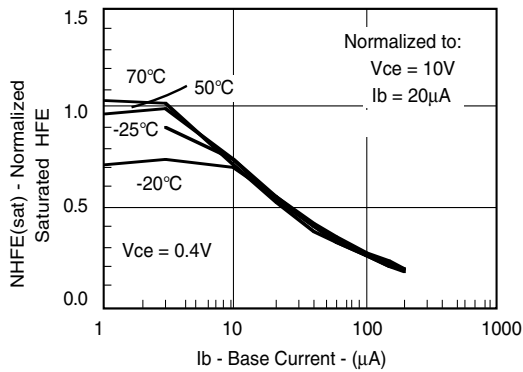
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Figure 11. Normalized Saturated HFE vs. Base Current and Temperature



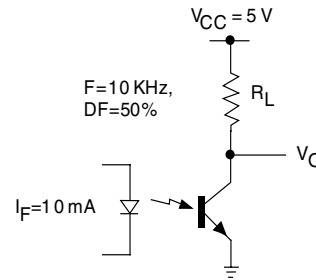
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Figure 14. Switching Waveform



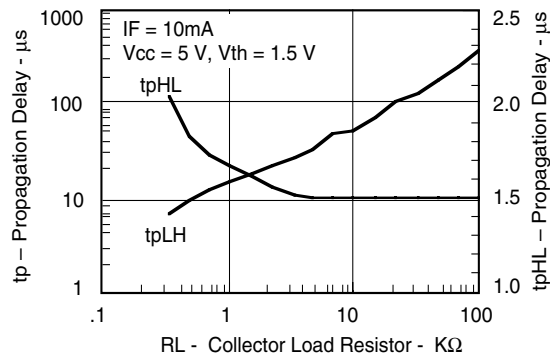
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Figure 12. Normalized Saturated HFE vs. Base Current and Temperature



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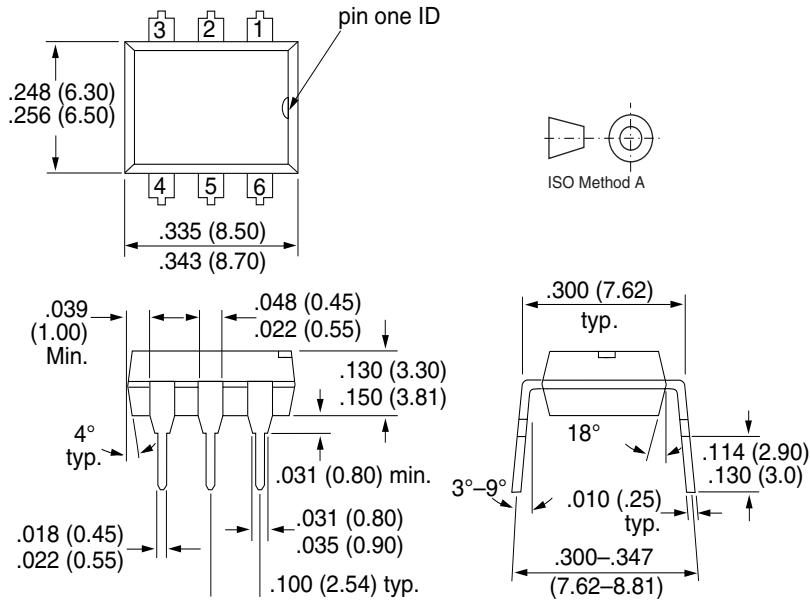
Figure 15. Switching Schematic



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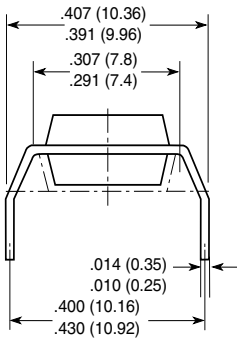
Figure 13. Propagation Delay vs. Collector Load Resistor

## Package Dimensions in Inches (mm)

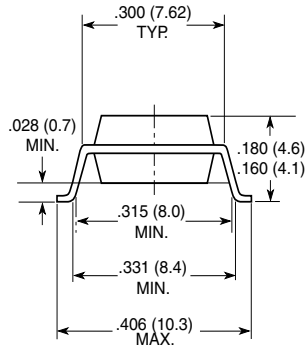


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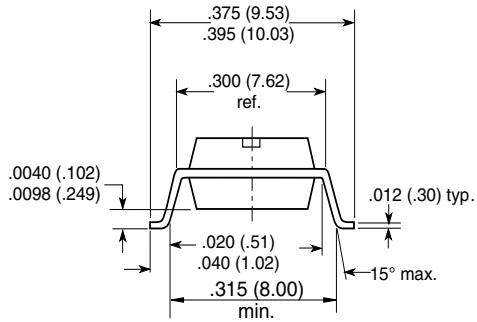
Option 6



Option 7



Option 9



18450

## **Ozone Depleting Substances Policy Statement**

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

We reserve the right to make changes to improve technical design and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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