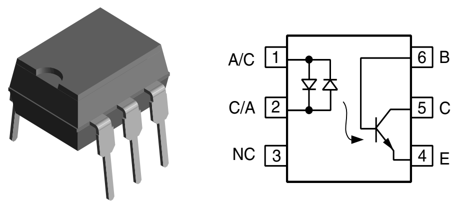
Optocoupler, Phototransistor Output, AC input, With Base Connection

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_{RMS}



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Agency Approvals

- UL File #E52744 System Code H or J
- CSA 93751
- BSI
- 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-Xxx6	CTR > 20 %, DIP-6 400 mil (option 6)
H11AA1-Xxx7	CTR > 20 %, SMD-6 (option 7)
H11AA1-Xxx9	CTR > 20 %, SMD-6 (option 9)

For additional option information and package dimensions see Option Section.

Absolute Maximum Ratings

T_{amb} = 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
Continuous forward current		I_F	60	mA
Power dissipation		P_{diss}	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}
Creepage			≥ 7.0	mm
Clearance			≥ 7.0	mm
Comparative tracking index per DIN IEC 112/VDE 0303, part 1			175	
Isolation resistance	V_{IO} = 500 V, T_{amb} = 25 °C	R_{IO}	$\geq 10^{12}$	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	$\geq 10^{11}$	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 °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 = ± 10 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 mA	BV_{CEO}	30			V
Emitter-base breakdown voltage	I_E = 100 µA	BV_{EBO}	5.0			V
Collector-base breakdown voltage	I_C = 100 µA	BV_{CBO}	70			V
Leakage current, collector-emitter	V_{CE} = 10 V	I_{CEO}		5.0	100	nA

Coupler

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

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Current Transfer Ratio

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

Typical Characteristics (T_{amb} = 25 °C unless otherwise specified)

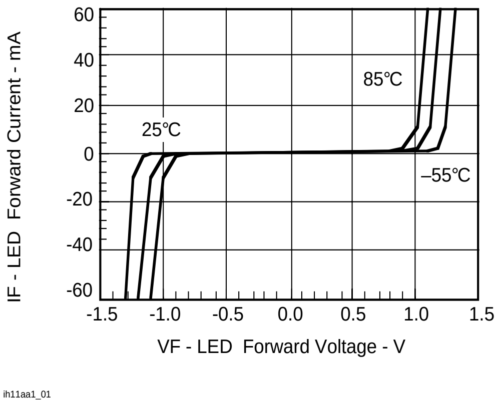

Figure 1. LED Forward Current vs.Forward Voltage

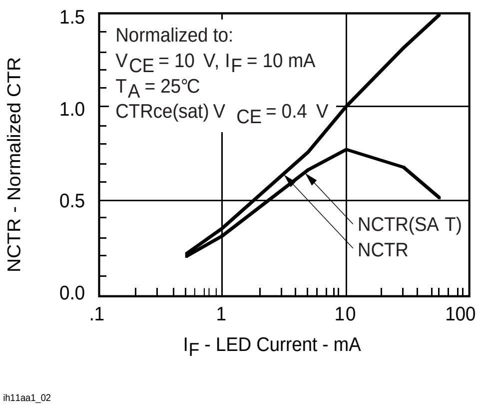

Figure 2. Normalized Non-saturated and Saturated CTR vs. LED Current

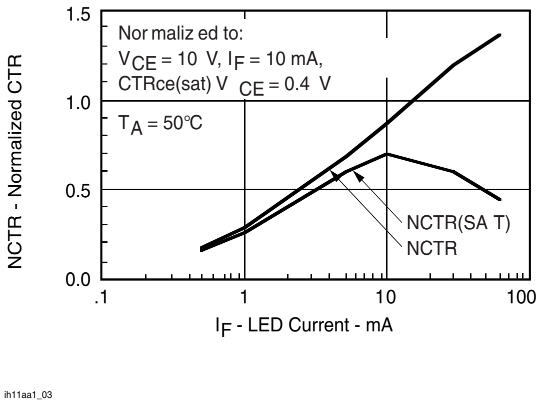

Figure 3. Normalized Non-saturated and Saturated CTR vs. LED Current

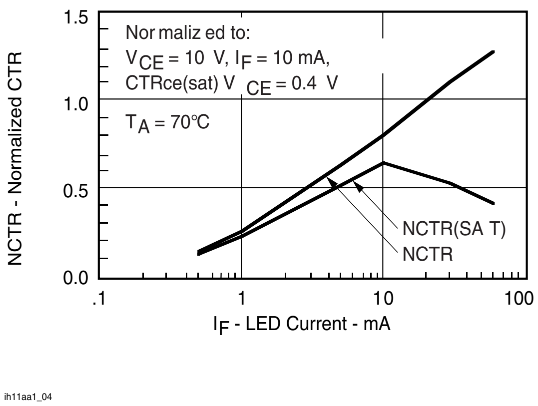

Figure 4. Normalized Non-saturated and saturated CTR vs. LED Current

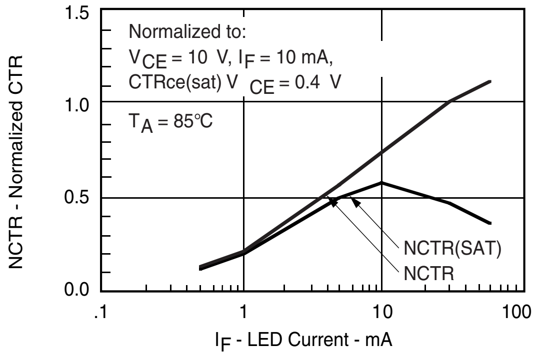

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Figure 5. Normalized Non-saturated and saturated CTR vs. LED Current

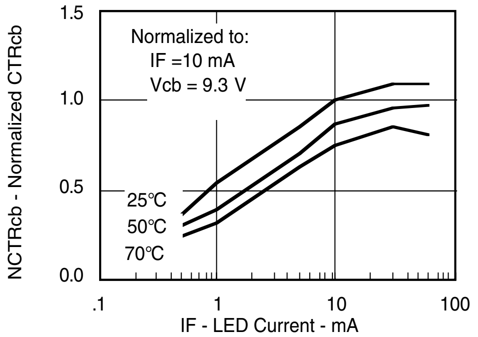

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Figure 8. Normalized CTRcb vs. LED Current and Temp.

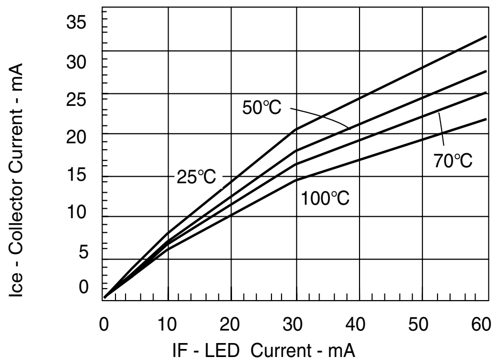

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Figure 6. Collector-Emitter Current vs. Temperature and LED Current

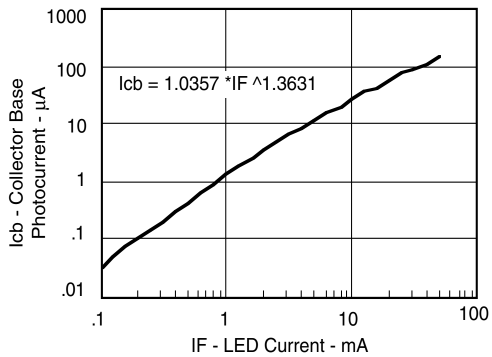

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Figure 9. Collector-Base Photocurrent vs. LED Current

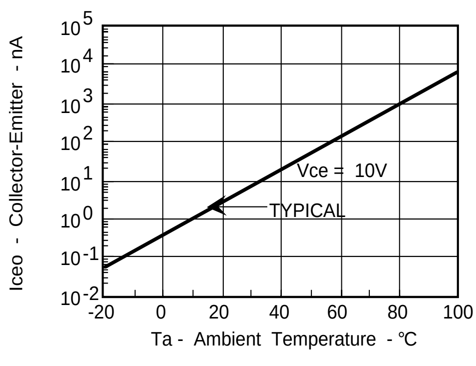

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Figure 7. Collector-Emitter Leakage Current vs.Temp.

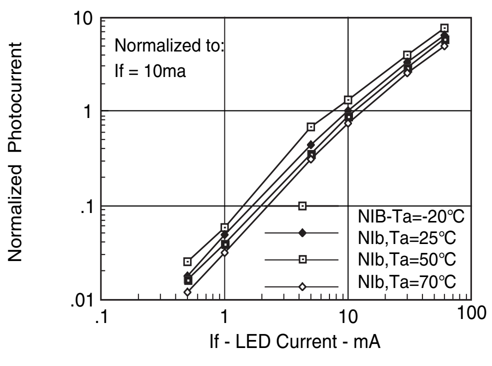

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Figure 10. Normalized Photocurrent vs. LED Current

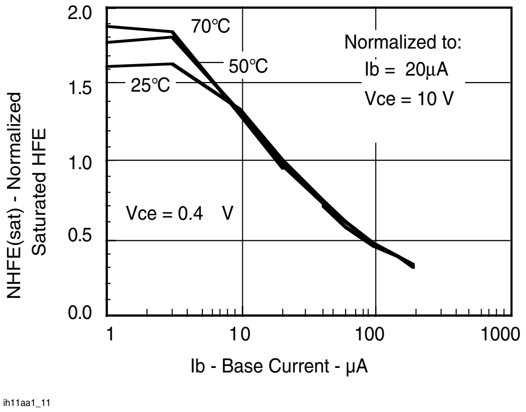


Figure 11. Normalized Saturated HFE vs. Base Current and Temperature

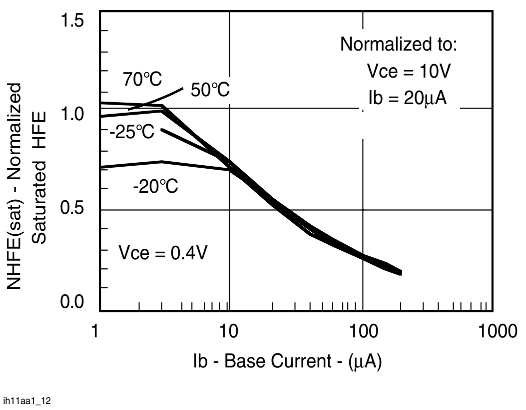


Figure 12. Normalized Saturated HFE vs. Base Current and Temperature

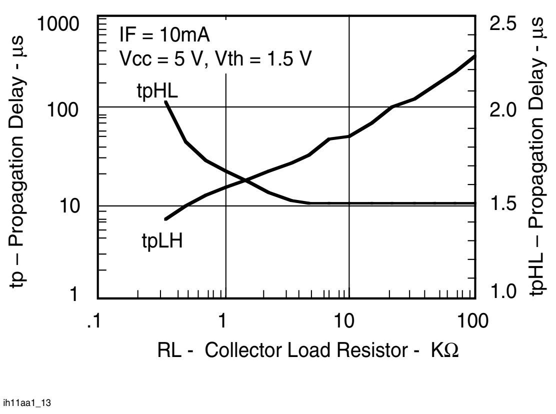


Figure 13. Propagation Delay vs. Collector Load Resistor

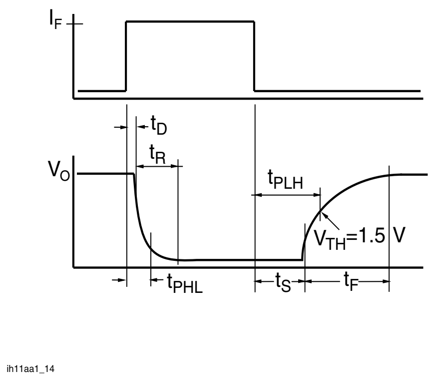


Figure 14. Switching Waveform

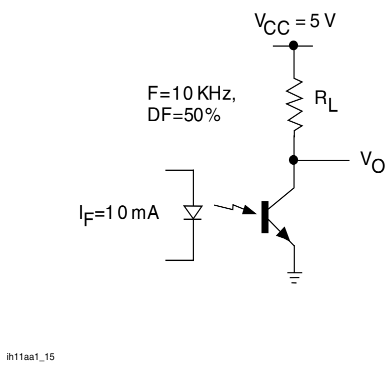
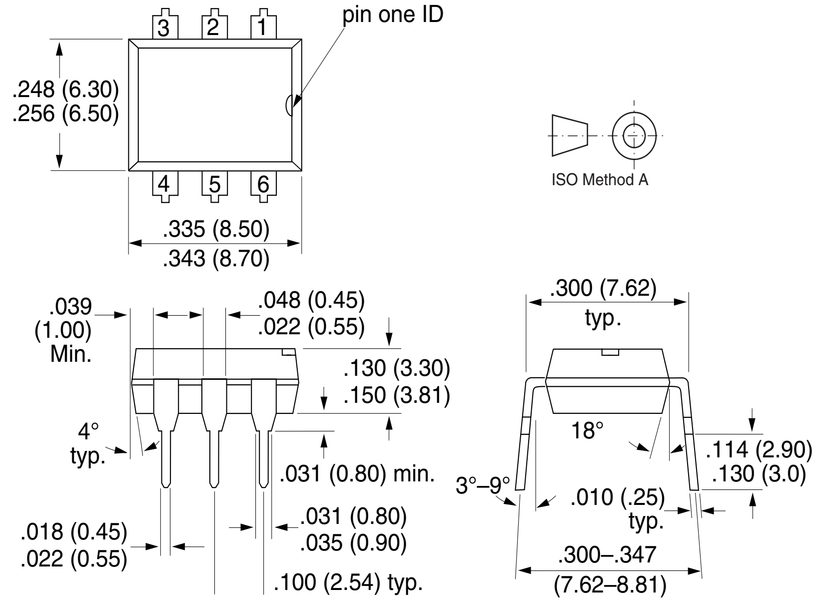


Figure 15. Switching Schematic

Package Dimensions in Inches (mm)



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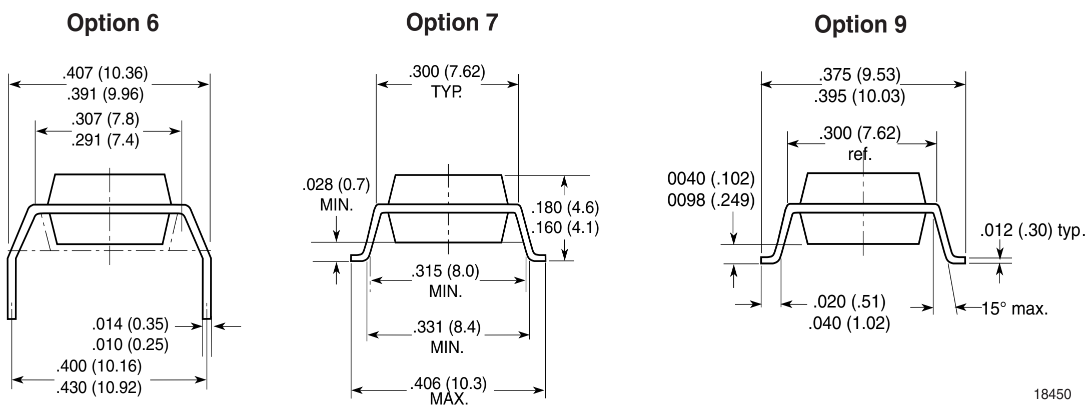

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Ozone Depleting Substances Policy Statement

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 operatingsystems 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.

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