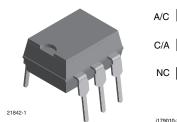
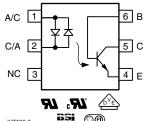


# Vishay Semiconductors

# Optocoupler, Phototransistor Output, AC Input, with Base Connection





#### **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.

#### **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>
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

# Pb-free



# RoHS

#### **APPLICATIONS**

- Telephone line detection
- AC line motor
- PLC
- Instrumentation

#### **AGENCY APPROVALS**

- UL1577, file no. E52744 system code H, double protection
- CSA 93751
- BSI IEC 60950; IEC 60065
- DIN EN 60747-5-2 (VDE0884)/DIN EN 60747-5-5 (pending), available with option 1
- FIMKO

ORDERING INFORMATION						
H 1 1 A A PART NUMBER	PACKAGE OPTION TAPEAND REEL Option 7 Option 9					
AGENCY CERTIFIED/PACKAGE	CTR (%)					
UL, cUL, BSI, FIMKO	≥ 20					
DIP-6	H11AA1					
DIP-6, 400 mil, option 6	H11AA1-X006					
SMD-6, option 7	H11AA1-X007T <sup>(1)</sup>					
SMD-6, option 9	H11AA1-X009T <sup>(1)</sup>					
VDE, UL, cUL, BSI, FIMKO	≥ 20					
DIP-6	H11AA1-X001					

#### Note

- Additional options may be possible, please contact sales office.
- (1) Also available in tubes; do not add T to end.

# VISHA

## Vishay Semiconductors Optocoupler, Phototransistor Output, AC Input, with Base Connection

<b>ABSOLUTE MAXIMUM RATINGS</b> (T <sub>amb</sub> = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	SYMBOL VALUE		UNIT			
INPUT							
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							
Power dissipation		P <sub>diss</sub>	200	mW			
Derate linearly from 25 °C			2.6	mW/°C			
Collector emitter breakdown voltage		BV <sub>CEO</sub>	30	V			
Emitter base breakdown voltage		BV <sub>EBO</sub>	5	V			
Collector base breakdown voltage		BV <sub>CBO</sub>	70	V			
COUPLER							
Isolation test voltage (RMS)	Between emitter and detector, referred to standard climate 23 °C/50% RH, DIN 50014	$V_{ISO}$	5300	$V_{RMS}$			
Creepage distance			≥ 7	mm			
Clearance distance			≥ 7	mm			
Comparative tracking index	per DIN IEC 112/VDE 0303, part 1	CTI	175				
Isolation resistance	$V_{IO} = 500 \text{ V}, T_{amb} = 25 ^{\circ}\text{C}$	R <sub>IO</sub>	≥ 10 <sup>12</sup>	Ω			
1501ation resistance	V <sub>IO</sub> = 500 V, T <sub>amb</sub> = 100 °C	R <sub>IO</sub>	≥ 10 <sup>11</sup>	Ω			
Storage temperature range		T <sub>stg</sub>	- 55 to + 150	°C			
Operating temperature range		T <sub>amb</sub>	- 55 to + 100	°C			
Lead soldering time at 260 °C		T <sub>sld</sub>	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.

<b>ELECTRICAL CHARACTERISTCS</b> (T <sub>amb</sub> = 25 °C, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
Forward voltage	$I_F = \pm 10 \text{ mA}$	V <sub>F</sub>		1.2	1.5	V
OUTPUT						
Collector emitter breakdown voltage	I <sub>C</sub> = 1 mA	BV <sub>CEO</sub>	30			V
Emitter base breakdown voltage	I <sub>E</sub> = 100 μA	BV <sub>EBO</sub>	5			V
Collector base breakdown voltage	I <sub>C</sub> = 100 μA	BV <sub>CBO</sub>	70			V
Collector emitter leakage current	V <sub>CE</sub> = 10 V	I <sub>CEO</sub>		5	100	nA
COUPLER						
Collector emitter saturation voltage	$I_F = \pm 10 \text{ mA}, I_C = 0.5 \text{ mA}$	V <sub>CEsat</sub>			0.4	V

#### Note

Minimum and maximum values were tested requierements. 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 <sub>amb</sub> = 25 °C, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
DC current transfer ratio	$I_F = \pm 10 \text{ mA}, V_{CE} = 10 \text{ V}$	CTR <sub>DC</sub>	20			%
Symmetry (CTR at + 10 mA)/(CTR at - 10 mA)			0.33	1	3	



# Optocoupler, Phototransistor Output, Vishay Semiconductors AC Input, with Base Connection

## TYPICAL CHARACTERISTICS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

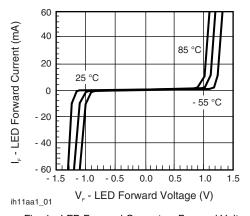


Fig. 1 - LED Forward Current vs.Forward Voltage

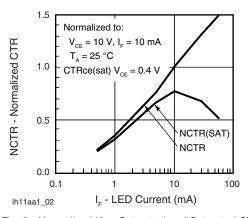


Fig. 2 - Normalized Non-Saturated and Saturated CTR vs. LED Current

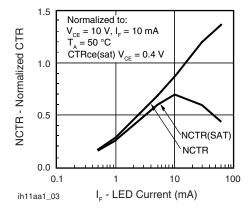


Fig. 3 - Normalized Non-Saturated and Saturated CTR vs. LED Current

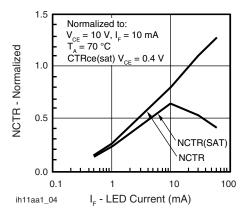


Fig. 4 - Normalized Non-Saturated and Saturated CTR vs. LED Current

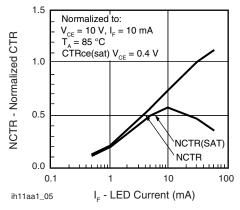


Fig. 5 - Normalized Non-Saturated and Saturated CTR vs. LED Current

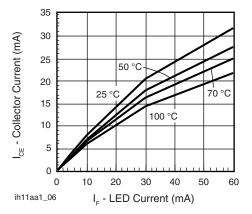


Fig. 6 - Collector Emitter Current vs. Temperature and LED Current

## Vishay Semiconductors Optocoupler, Phototransistor Output, AC Input, with Base Connection



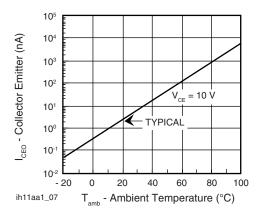


Fig. 7 - Collector Emitter Leakage Current vs. Temperature

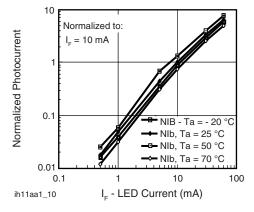


Fig. 10 - Normalized Photocurrent vs. LED Current

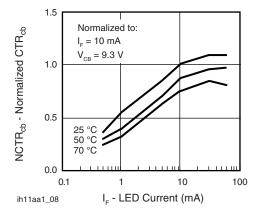


Fig. 8 - Normalized  $CTR_{cb}$  vs. LED Current and Temperature

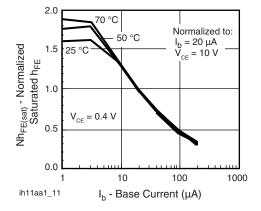


Fig. 11 - Normalized Saturated h<sub>FE</sub> vs. Base Current and Temperature

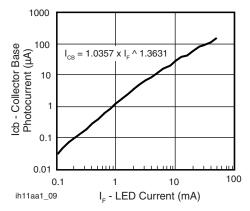


Fig. 9 - Collector Base Photocurrent vs. LED Current

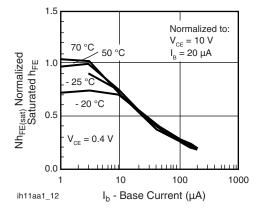


Fig. 12 - Normalized Saturated h<sub>FE</sub> vs. Base Current and Temperature



# Optocoupler, Phototransistor Output, Vishay Semiconductors AC Input, with Base Connection

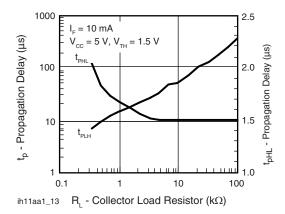
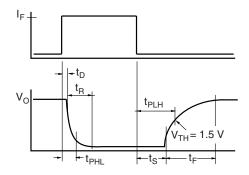
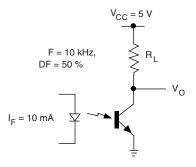


Fig. 13 - Propagation Delay vs. Collector Load Resistor



ih11aa1\_14

Fig. 14 - Switching Waveform



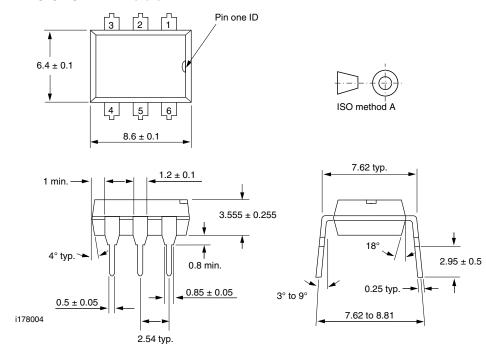
ih11aa1\_15

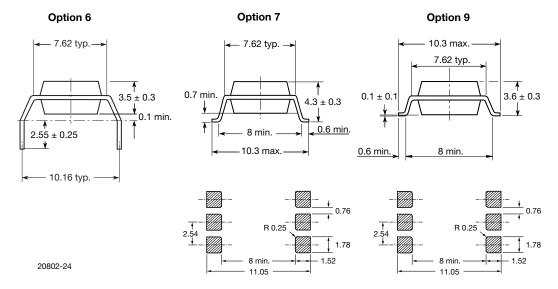
Fig. 15 - Switching Schematic

# Vishay Semiconductors Optocoupler, Phototransistor Output, AC Input, with Base Connection



#### **PACKAGE DIMENSIONS** in millimeters





#### **PACKAGE MARKING**



#### Notes

- Only options 1 and 7 are reflected in the package marking.
- The VDE Logo is only marked on option1 parts.
- Tape and reel suffix (T) is not part of the package marking.



# **Legal Disclaimer Notice**

Vishay

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