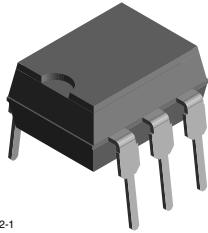
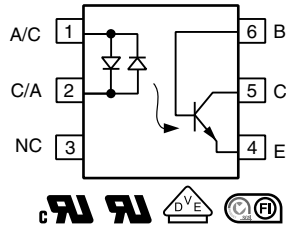


## Optocoupler, Phototransistor Output, AC Input, With Base Connection



21842-1



### 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>
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### APPLICATIONS

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

### LINKS TO ADDITIONAL RESOURCES



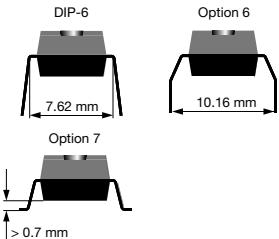
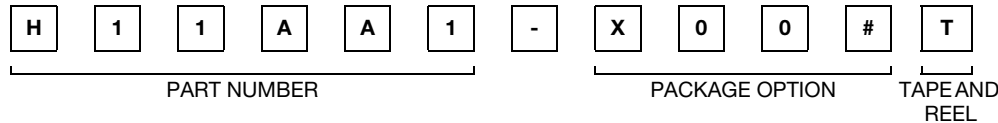
### DESCRIPTION

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.

### AGENCY APPROVALS

- [UL 1577](#)
- [cUL](#)
- [DIN EN 60747-5-5 \(VDE0884-5\)](#), available with option 1
- [BSI](#)
- [FIMKO](#)

### ORDERING INFORMATION



AGENCY CERTIFIED / PACKAGE	CTR (%)
<b>UL, cUL, BSI, FIMKO</b>	<b>≥ 20</b>
DIP-6	H11AA1
DIP-6, 400 mil, option 6	H11AA1-X006
SMD-6, option 7	H11AA1-X007T
<b>UL, cUL, BSI, FIMKO, VDE (Option 1)</b>	<b>≥ 20</b>
DIP-6	H11AA1-X001

### Notes

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



<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Forward continuous current		$I_F$	$\pm 60$	mA
Power dissipation		$P_{diss}$	100	mW
Derate linearly from 25 °C			1.3	mW/°C
<b>OUTPUT</b>				
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	V
Collector base breakdown voltage		$BV_{CBO}$	70	V
<b>COUPLER</b>				
Storage temperature range		$T_{stg}$	-55 to +150	°C
Operating temperature range		$T_{amb}$	-55 to +100	°C
Lead soldering time at 260 °C		$T_{sld}$	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 CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Forward voltage	$I_F = \pm 10\text{ mA}$	$V_F$	-	1.2	1.5	V
<b>OUTPUT</b>						
Collector emitter breakdown voltage	$I_C = 1\text{ mA}$	$BV_{CEO}$	30	-	-	V
Emitter base breakdown voltage	$I_E = 100\text{ }\mu\text{A}$	$BV_{EBO}$	5	-	-	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	100	nA
<b>COUPLER</b>						
Collector emitter saturation voltage	$I_F = \pm 10\text{ mA}$ , $I_C = 0.5\text{ mA}$	$V_{CEsat}$	-	-	0.4	V

**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.

<b>CURRENT TRANSFER RATIO</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
DC current transfer ratio	$I_F = \pm 10\text{ mA}$ , $V_{CE} = 10\text{ V}$	$CTR_{DC}$	20	-	-	%
Symmetry (CTR at + 10 mA)/(CTR at - 10 mA)			0.33	1	3	

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.

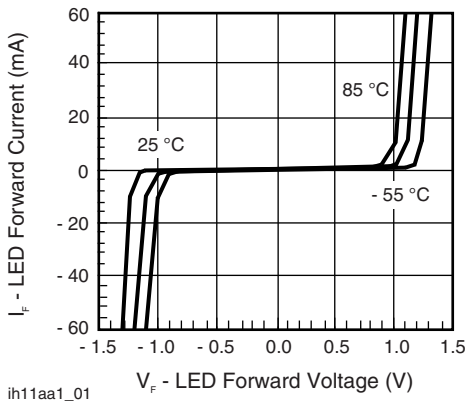
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - LED Forward Current vs. Forward Voltage

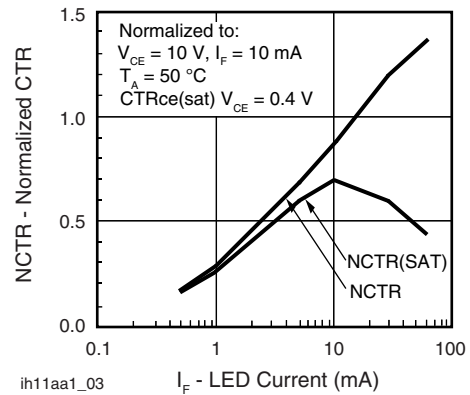


Fig. 3 - Normalized Non-Saturated and Saturated CTR vs. LED Current

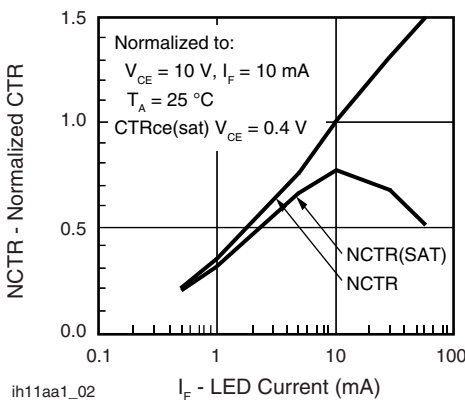


Fig. 2 - Normalized Non-Saturated and Saturated CTR vs. LED Current

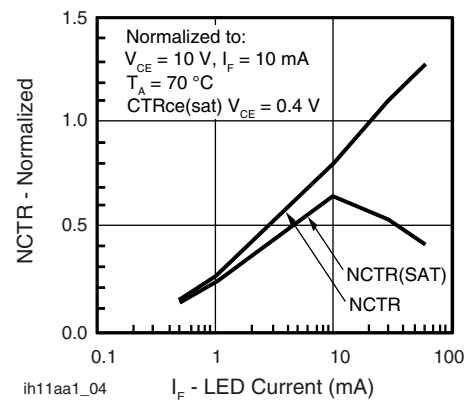


Fig. 4 - Normalized Non-Saturated and Saturated CTR vs. LED Current

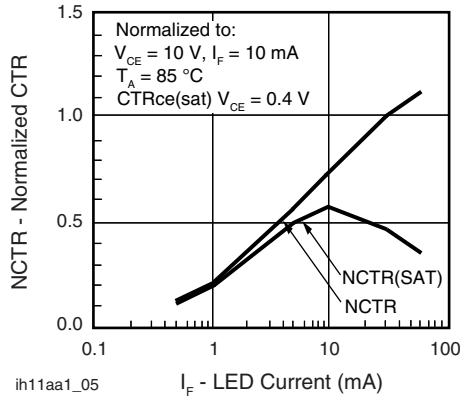


Fig. 5 - Normalized Non-Saturated and Saturated CTR vs. LED Current

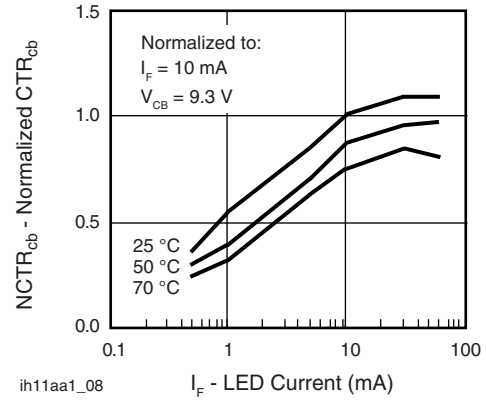


Fig. 8 - Normalized  $CTR_{cb}$  vs. LED Current and Temperature

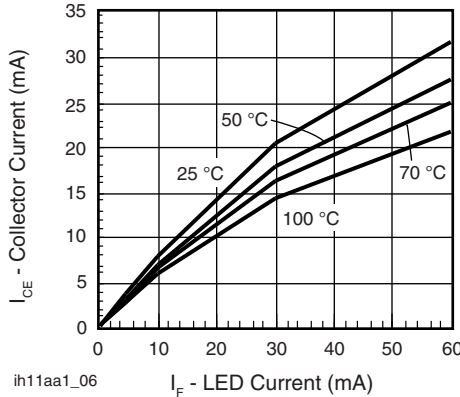


Fig. 6 - Collector Emitter Current vs. Temperature and LED Current

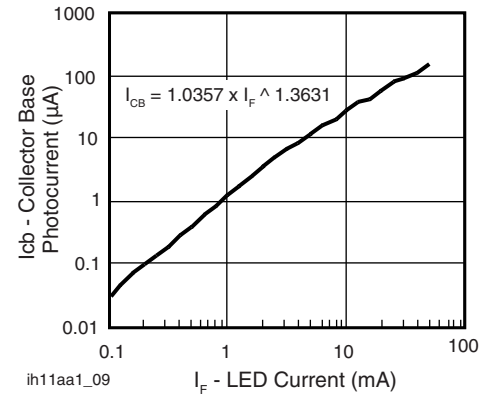


Fig. 9 - Collector Base Photocurrent vs. LED Current

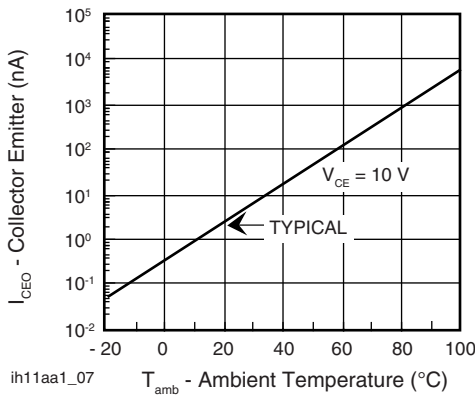


Fig. 7 - Collector Emitter Leakage Current vs. Temperature

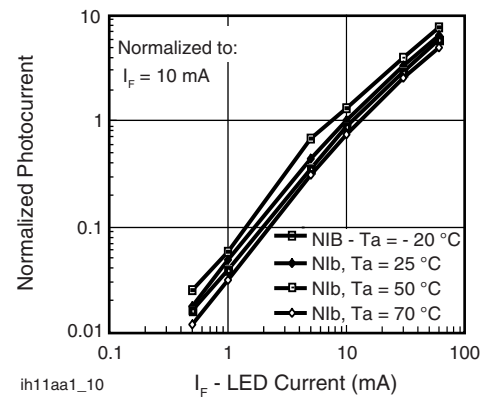


Fig. 10 - Normalized Photocurrent vs. LED Current

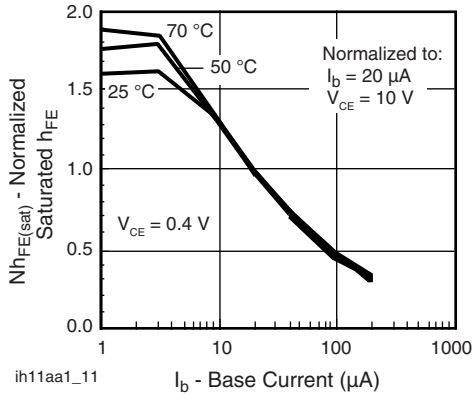


Fig. 11 - Normalized Saturated  $h_{FE}$  vs. Base Current and Temperature

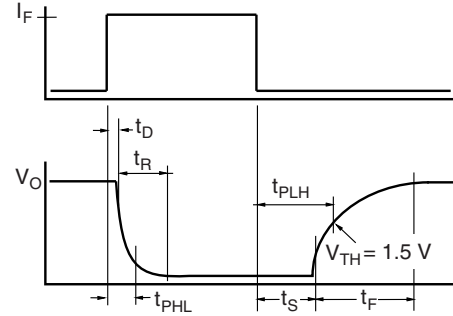


Fig. 14 - Switching Waveform

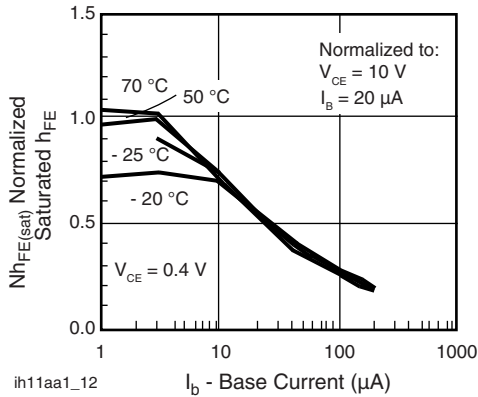


Fig. 12 - Normalized Saturated  $h_{FE}$  vs. Base Current and Temperature

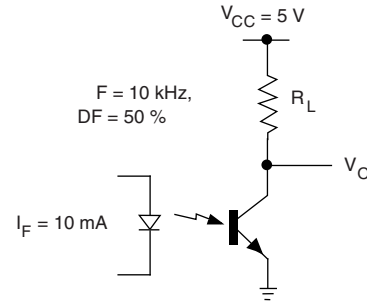


Fig. 15 - Switching Schematic

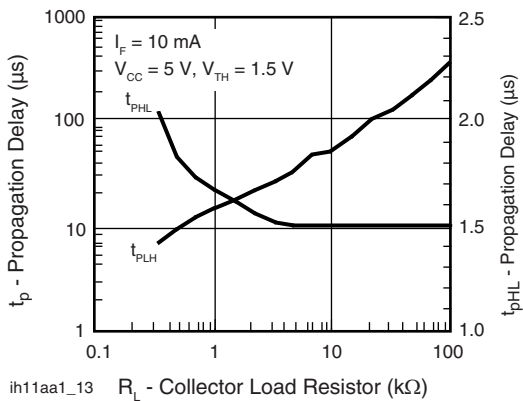
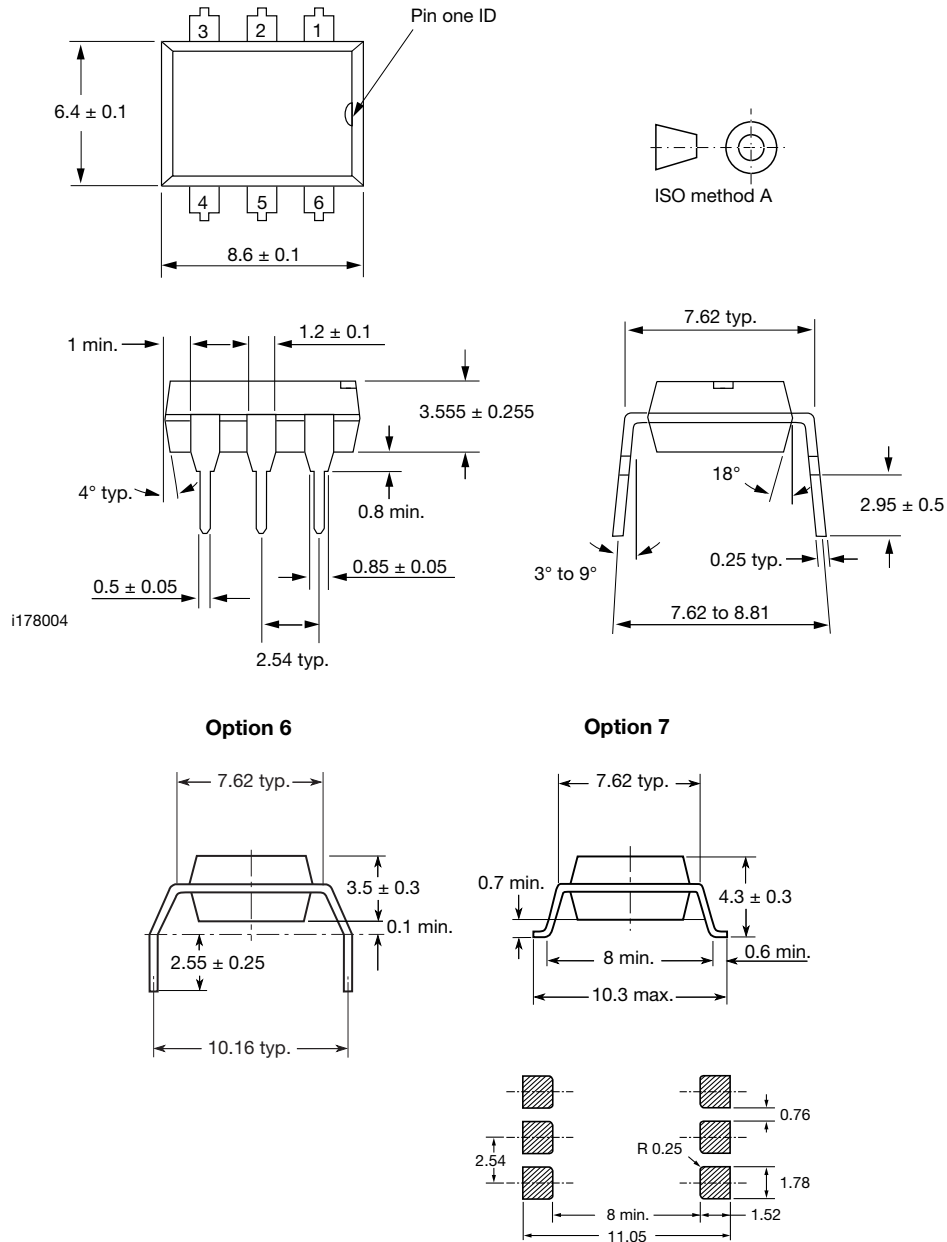
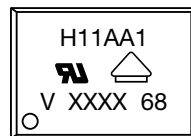


Fig. 13 - Propagation Delay vs. Collector Load Resistor

## PACKAGE DIMENSIONS in millimeters



## PACKAGE MARKING



### Notes

- XXXX = LMC (lot marking code)
- 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



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