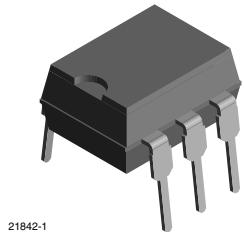
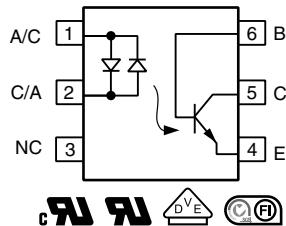


Optocoupler, Phototransistor Output, AC Input, With Base Connection



21842-1


RoHS
COMPLIANT

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}
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

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

AGENCY APPROVALS

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

LINKS TO ADDITIONAL RESOURCES



Product Page



Design Tools


SPICE
Models


Footprints



Schematics

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.

ORDERING INFORMATION

H	1	1	A	A	1	-	X	0	0	#	T
---	---	---	---	---	---	---	---	---	---	---	---

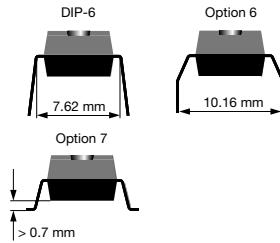
PART NUMBER

-	X	0	0	#	T
---	---	---	---	---	---

PACKAGE OPTION

-	X	0	0	#	T
---	---	---	---	---	---

TAPE AND REEL



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

UL, cUL, BSI, FIMKO, VDE (Option 1)

≥ 20

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

ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25 \text{ }^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Forward continuous current		I_F	± 60	mA
Power dissipation		P_{diss}	100	mW
Derate linearly from 25 °C			1.3	mW/°C
OUTPUT				
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
COUPLER				
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.

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

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
Forward voltage	$I_F = \pm 10 \text{ mA}$	V_F	-	1.2	1.5	V
OUTPUT						
Collector emitter breakdown voltage	$I_C = 1 \text{ mA}$	BV_{CEO}	30	-	-	V
Emitter base breakdown voltage	$I_E = 100 \mu\text{A}$	BV_{EBO}	5	-	-	V
Collector base breakdown voltage	$I_C = 100 \mu\text{A}$	BV_{CBO}	70	-	-	V
Collector emitter leakage current	$V_{CE} = 10 \text{ V}$	I_{CEO}	-	5	100	nA
COUPLER						
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.

CURRENT TRANSFER RATIO ($T_{amb} = 25 \text{ }^{\circ}\text{C}$, unless otherwise specified)

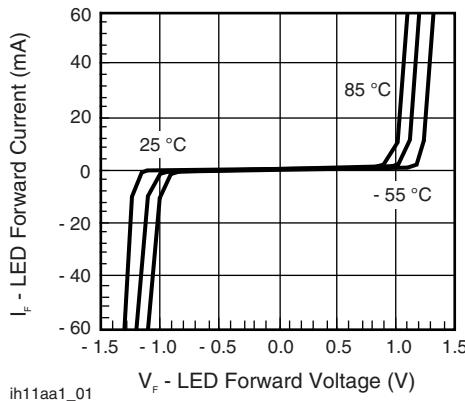
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
DC current transfer ratio	$I_F = \pm 10 \text{ mA}, V_{CE} = 10 \text{ V}$	CTR_{DC}	20	-	-	%
Symmetry (CTR at + 10 mA)/(CTR at - 10 mA)			0.33	1	3	

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	$t = 1 \text{ min}$	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	$V_{\text{IO}} = 500 \text{ V}, T_{\text{amb}} = 25 \text{ }^{\circ}\text{C}$	R_{IO}	$\geq 10^{12}$	Ω
	$V_{\text{IO}} = 500 \text{ V}, T_{\text{amb}} = 100 \text{ }^{\circ}\text{C}$	R_{IO}	$\geq 10^{11}$	Ω
Output safety power		P_{SO}	400	mW
Input safety current		I_{SI}	275	mA
Safety temperature		T_{S}	175	$^{\circ}\text{C}$
Creepage distance			≥ 7	mm
Clearance distance			≥ 7	mm
Insulation thickness		DTI	≥ 0.4	mm

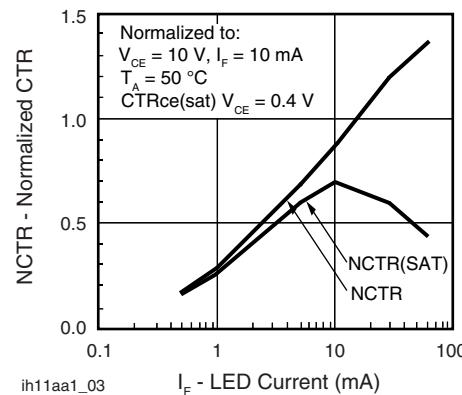
Note

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


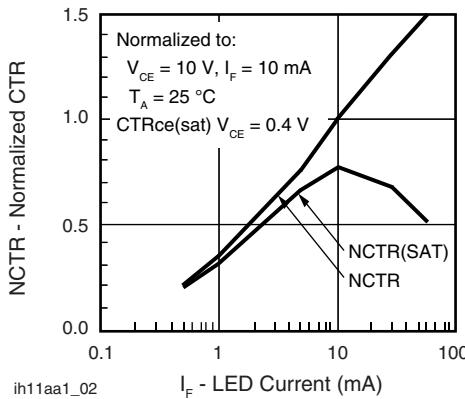
ih11aa1_01

Fig. 1 - LED Forward Current vs. Forward Voltage



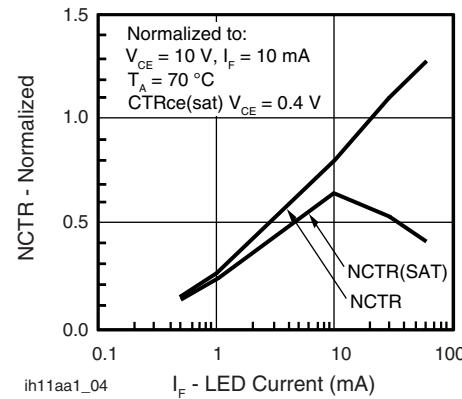
ih11aa1_03

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



ih11aa1_02

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



ih11aa1_04

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

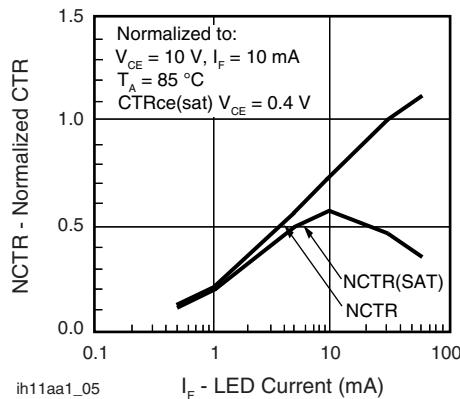


Fig. 5 - Normalized Non-Saturated and Saturated CTR vs. LED Current

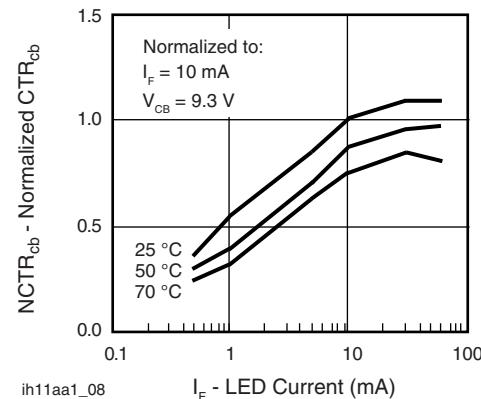


Fig. 8 - Normalized CTR_{cb} vs. LED Current and Temperature

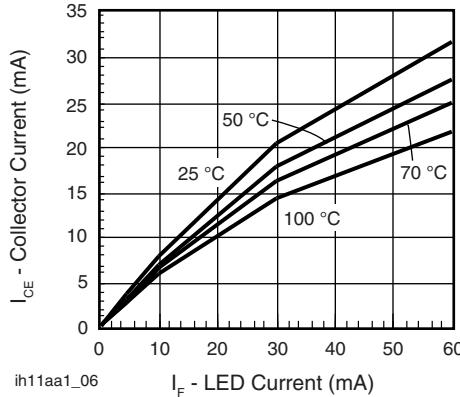


Fig. 6 - Collector Emitter Current vs. Temperature and LED Current

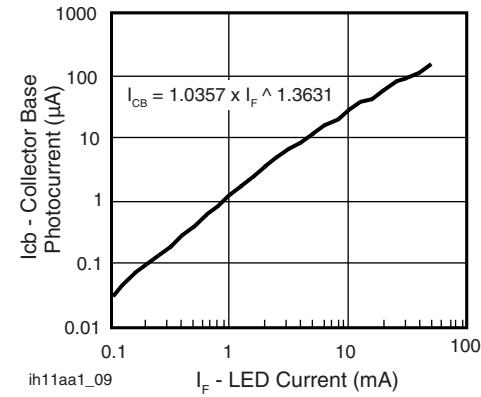


Fig. 9 - Collector Base Photocurrent vs. LED Current

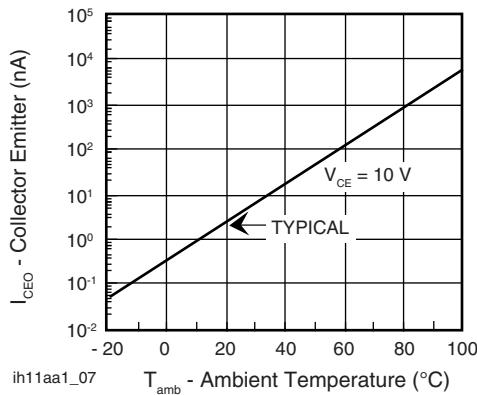


Fig. 7 - Collector Emitter Leakage Current vs. Temperature

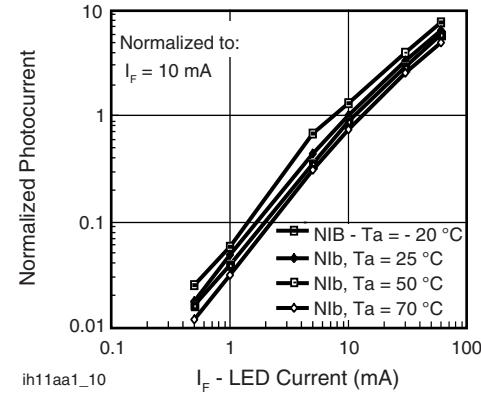


Fig. 10 - Normalized Photocurrent vs. LED Current

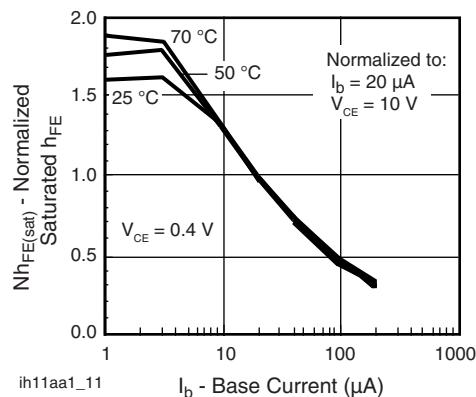


Fig. 11 - Normalized Saturated h_{FE} vs.
Base Current and Temperature

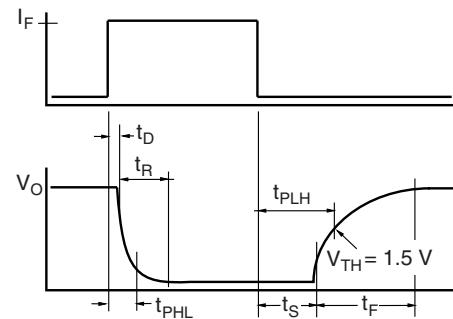


Fig. 14 - Switching Waveform

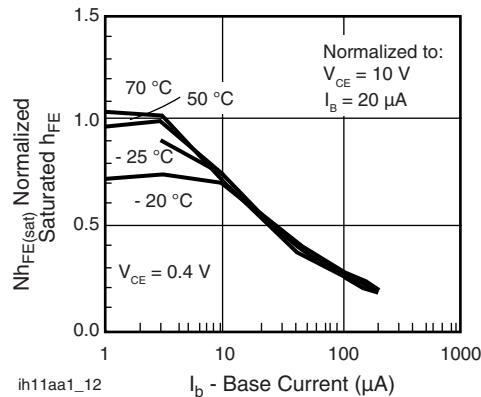


Fig. 12 - Normalized Saturated h_{FE} vs.
Base Current and Temperature

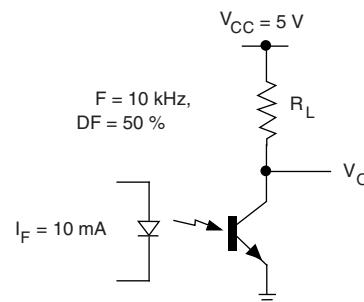


Fig. 15 - Switching Schematic

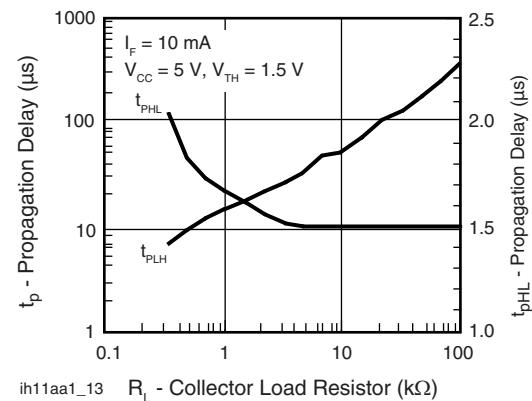
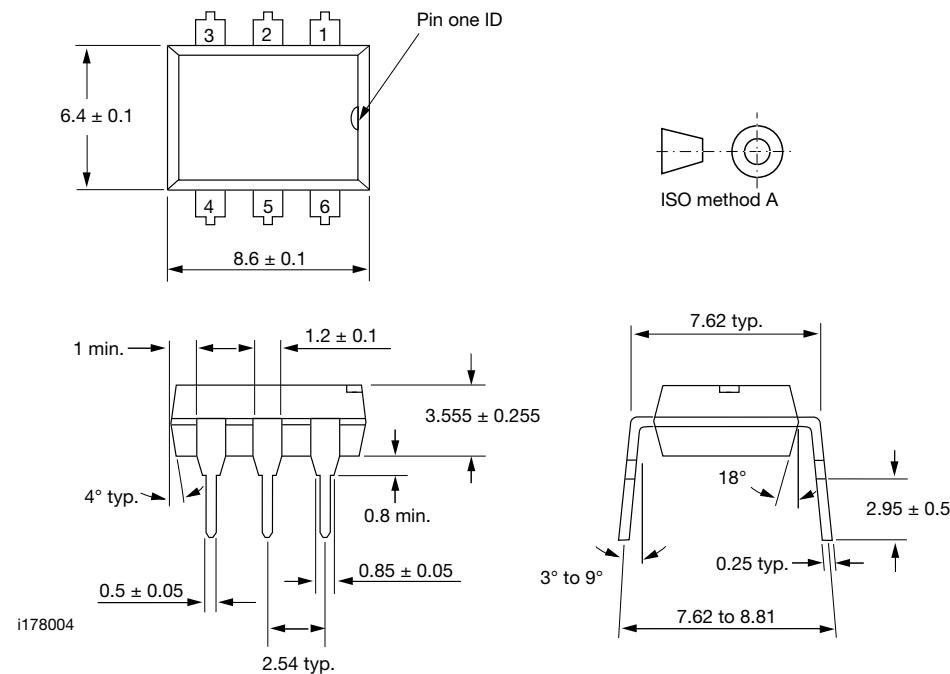
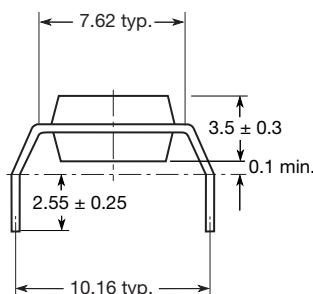
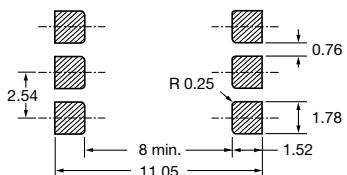
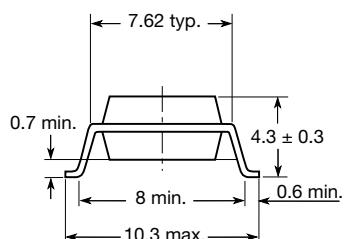
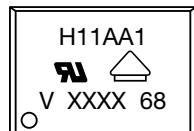


Fig. 13 - Propagation Delay vs. Collector Load Resistor

PACKAGE DIMENSIONS in millimeters

Option 6

Option 7

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

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.