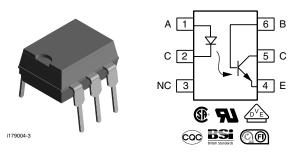


Vishay Semiconductors

Optocoupler, Phototransistor Output, with Base Connection



FEATURES

- · Interfaces with common logic families
- Input-output coupling capacitance < 0.5 pF
- Industry standard dual-in line 6-pin package
- Isolation rated voltage 4420 V_{RMS}
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912





DESCRIPTION

The H11Ax family is an industry standard single channel phototransistor coupler. It includes the H11A1, H11A2, H11A3, H11A4, H11A5 couplers.

Each optocoupler consists of gallium arsenide infrared LED and a silicon NPN phototransistor.

The isolation performance is accomplished through Vishay double molding isolation manufacturing process. Compliance to DIN EN 60747-5-5 partial discharge isolation specification is available is by ordering option 1.

These isolation processes and the Vishay ISO9001 quality program results in the highest isolation performance available for a commercial plastic phototransistor optocoupler.

The devices are available in lead formed configuration suitable for surface mounting and are available either on tape and reel, or in standard tube shipping containers.

Note

Designing with data sheet is covered in Application Note 45.

APPLICATIONS

- AC mains detection
- · Reed relay driving
- Switch mode power supply feedback
- Telephone ring detection
- · Logic ground isolation
- Logic coupling with high frequency noise rejection

AGENCY APPROVALS

- UL1577, file no. E52744, double protection
- cUL tested to CSA 22.2 bulletin 5A
- CSA 93751
- BSI EN 60950, BSI EN 60065
- DIN EN 60747-5-5 (VDE 0884-5), available with option 1
- FIMKO
- CQC: GB 8898-2011, GB 4943.1-2011

ORDERING INFORMATION	
H 1 1 A PART NUMBER	# - X 0 0 # X PACKAGE OPTION TAPE AND REEL Option 9 Option 9
AGENCY CERTIFIED/PACKAGE	CTR (%)
UL, CSA, BSI, FIMKO, CQC	> 50
DIP-6	H11A1, H11A1-X001
DIP-6, 400 mil, option 6	H11A1-X006
SMD-6, option 9	H11A1-X009, H11A1-X009T

Note

• Additional options may be possible, please contact sales office.



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ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °C, unless otherwise specified)								
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT				
INPUT								
Reverse voltage		V_R	6	V				
Forward current		l _F	60	mA				
Surge current	t ≤ 10 µs	I _{FSM}	2.5	Α				
Power dissipation		P _{diss}	100	mW				
OUTPUT								
Collector emitter breakdown voltage		V_{CEO}	70	V				
Emitter base breakdown voltage		V_{EBO}	7	V				
Collector current		I _C	50	mA				
Collector current	t < 1 ms	I _C	100	mA				
Power dissipation		P _{diss}	150	mW				
COUPLER								
Storage temperature range		T _{stg}	-55 to +150	°C				
Operating temperature range		T _{amb}	-55 to +100	°C				
Junction temperature		Tj	100	°C				
Soldering temperature	Max. 10 s, dip soldering: distance to seating plane ≥ 1.5 mm	T _{sld}	260	°C				

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 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT			•				
Forward voltage	I _F = 10 mA	H11A1	V _F		1.1	1.5	V
Reverse current	V _R = 3 V		I _R			10	μΑ
Capacitance	V _R = 0 V, f = 1 MHz		Co		50		pF
OUTPUT							
Collector emitter breakdown voltage	$I_C = 1 \text{ mA}, I_F = 0 \text{ mA}$		BV _{CEO}	30			V
Emitter collector breakdown voltage	$I_E = 100 \mu A, I_F = 0 mA$		BV _{ECO}	7			V
Collector base breakdown voltage	$I_{C} = 10 \mu A, I_{F} = 0 \text{ mA}$		BV _{CBO}	70			V
Collector emitter leakage current	$V_{CE} = 10 \text{ V}, I_F = 0 \text{ mA}$		I _{CEO}		5	50	nA
Emitter collector capacitance	V _{CE} = 0 V		C _{CE}		6		pF
COUPLER							
Collector emitter, saturation voltage	$I_{CE} = 0.5 \text{ mA}, I_{F} = 10 \text{ mA}$		V _{CEsat}			0.4	V
Capacitance (input-output)			C _{IO}		0.5		pF

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							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
I _C /I _F	$V_{CE} = 10 \text{ V}, I_F = 10 \text{ mA}$	H11A1	CTR _{DC}	50			%

SWITCHING CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Turn-on time	$I_C = 2 \text{ mA}, R_L = 100 \Omega, V_{CE} = 10 \text{ V}$	t _{on}		3		μs
Turn-off time	$I_{C} = 2 \text{ IIIA, } H_{L} = 100 22, V_{CE} = 10 V_{CE}$	t _{off}		3		μs



Vishay Semiconductors

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 V, T_{amb} = 25 °C	R _{IO}	≥ 10 ¹²	Ω			
isolation resistance	$V_{IO} = 500 \text{ V}, T_{amb} = 100 ^{\circ}\text{C}$	R _{IO}	≥ 10 ¹¹	Ω			
Output safety power		P _{SO}	400	mW			
Input safety current		I _{SI}	275	mA			
Safety temperature		T _S	175	°C			
Creepage distance			≥ 7	mm			
Clearance distance			≥ 7	mm			
Insulation thickness		DTI	≥ 0.4	mm			

Note

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

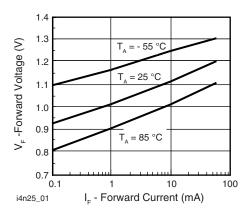


Fig. 1 - Forward Voltage vs. Forward Current

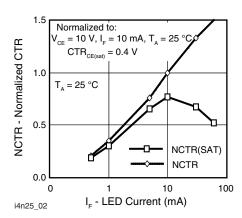


Fig. 2 - Normalized Non-Saturated and Saturated CTR vs. LED Current

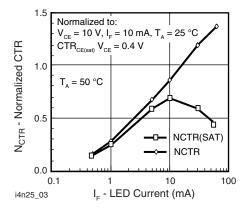


Fig. 3 - Normalized Non-Saturated and Saturated CTR vs. LED Current

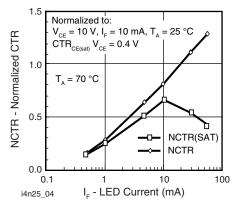


Fig. 4 - Normalized Non-Saturated and Saturated CTR vs. LED Current

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.





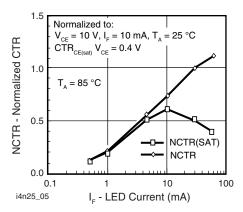


Fig. 5 - Normalized Non-Saturated and Saturated CTR vs. LED Current

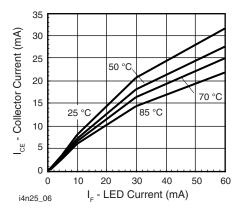


Fig. 6 - Collector Emitter Current vs.
Temperature and LED Current

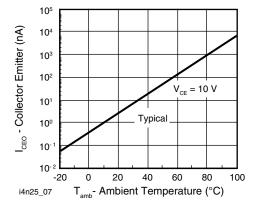


Fig. 7 - Collector Emitter Leakage Current vs. Temperature

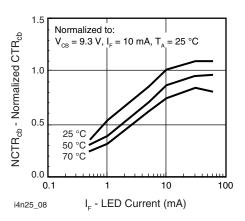


Fig. 8 - Normalized CTR_{cb} vs. LED Current and Temperature

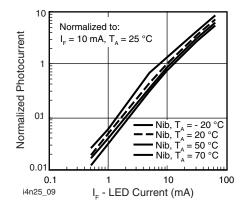


Fig. 9 - Normalized Photocurrent vs. I_{F} and Temperature

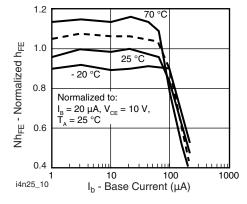
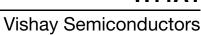


Fig. 10 - Normalized Non-Saturated h_{FE} vs. Base Current and Temperature





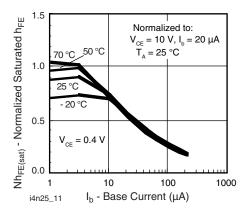


Fig. 11 - Normalized HFE vs. Base Current and Temperature

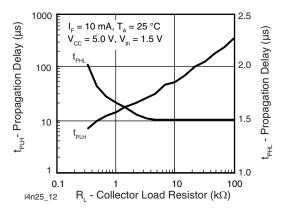


Fig. 12 - Propagation Delay vs. Collector Load Resistor

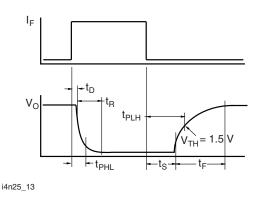


Fig. 13 - Switching Timing

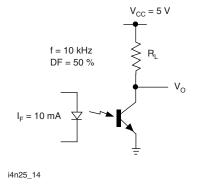


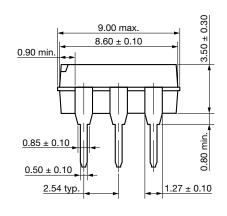
Fig. 14 - Switching Schematic

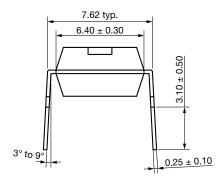


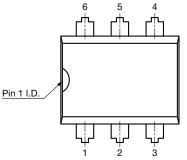


PACKAGE DIMENSIONS in millimeters

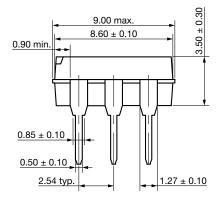
DIP-6

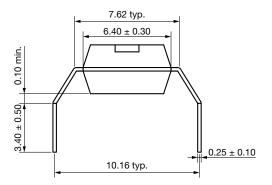


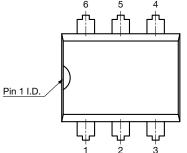




Option 6



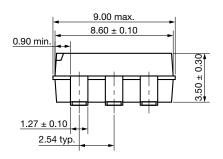


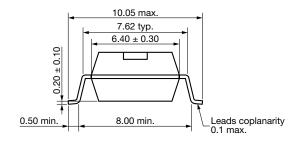


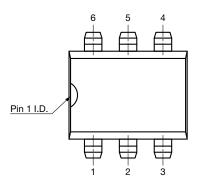
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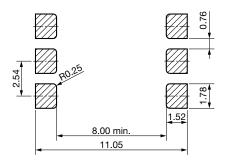
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Option 9











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