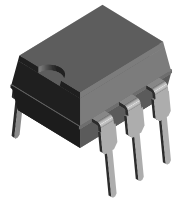
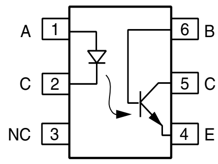
Optocoupler, Phototransistor Output, With Base Connection, High BV_{CER} Voltage

Features

- CTR at I_F = 10 mA, BV_{CER} = 10 V: ≥ 20 %
- Good CTR Linearly with Forward Current
- Low CTR Degradation
- Very High Collector-Emitter Breakdown Voltage
  - H11D1/H11D2, BV_{CER} = 300 V
  - H11D3/H11D4, BV_{CER} = 200 V
- Isolation Test Voltage: 5300 V_{RMS}
- Low Coupling Capacitance
- High Common Mode Transient Immunity
- Package with Base Connection





i179004

- Lead-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

Agency Approvals

- UL1577, File No. E52744 System Code H or J, Double Protection
- DIN EN 60747-5-2 (VDE0884)
  DIN EN 60747-5-5 pending
  Available with Option 1
- BSI IEC60950 IEC60065
- FIMKO

Applications

Telecommunications
Replace Relays

Description

The H11D1/ H11D2/ H11D3/ H11D4 are optocouplers with very high BV_{CER}. They are intended for telecommunications applications or any DC application requiring a high blocking voltage.

The H11D1/ H11D2 are identical and the H11D3/ H11D4 are identical.

Order Information

Part	Remarks
H11D1	CTR > 20 %, DIP-6
H11D2	CTR > 20 %, DIP-6
H11D3	CTR > 20 %, DIP-6
H11D4	CTR > 20 %, DIP-6
H11D1-X007	CTR > 20 %, SMD-6 (option 7)
H11D1-X009	CTR > 20 %, SMD-6 (option 9)
H11D2-X007	CTR > 20 %, SMD-6 (option 7)
H11D3-X007	CTR > 20 %, SMD-6 (option 7)

For additional information on the available options refer to Option Information.

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
Reverse voltage		V_R	6.0	V
DC forward current		I_F	60	mA
Surge forward current	t ≤ 10 μs	I_{FSM}	2.5	A
Power dissipation		P_{diss}	100	mW

Output

Parameter	Test condition	Part	Symbol	Value	Unit
Collector-emitter voltage		H11D1	V_{CE}	300	V
		H11D2	V_{CE}	300	V
		H11D3	V_{CE}	200	V
		H11D4	V_{CE}	200	V
Collector-base voltage		H11D1	V_{CBO}	300	V
		H11D2	V_{CBO}	300	V
		H11D3	V_{CBO}	200	V
		H11D4	V_{CBO}	200	V
Emitter-base voltage			V_{BEO}	7.0	V
Collector current			I_C	100	mA
Power dissipation			P_{diss}	300	mW

Coupler

Parameter	Test condition	Symbol	Value	Unit
Isolation test voltage (between emitter and detector, refer to climate DIN 50014, part 2, Nov. 74)		V_{ISO}	5300	V_{RMS}
Insulation thickness between emitter and detector			≥ 0.4	mm
Creepage distance			≥ 7.0	mm
Clearance distance			≥ 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}	≥ 10^{12}	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	≥ 10^{11}	Ω
Storage temperature range		T_{stg}	- 55 to + 150	°C
Operating temperature range		T_{amb}	- 55 to + 100	°C
Junction temperature		T_j	100	°C
Soldering temperature	max. 10 sec., dip soldering: distance to seating plane ≥ 1.5 mm	T_{sld}	260	°C

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		1.1	1.5	V
Reverse voltage	I_R = 10 μA	V_R	6.0			V
Reverse current	V_R = 6.0 V	I_R		0.01	10	μA
Capacitance	V_R = 0 V, f = 1.0 MHz	C_O		25		pF
Thermal resistance		R_{thja}		750		K/W

Output

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Collector-emitter breakdown voltage	I_{CE} = 1.0 mA, R_{BE} = 1.0 MΩ	H11D1	BV_{CER}	300			V
		H11D2	BV_{CER}	300			V
		H11D3	BV_{CER}	200			V
		H11D4	BV_{CER}	200			V
Emitter-base breakdown voltage	I_{EB} = 100 μA		BV_{EBO}	7.0			V
Collector-emitter capacitance	V_{CE} = 10 V, f = 1.0 MHz		C_{CE}		7.0		pF
Collector - base capacitance	V_{CB} = 10 V, f = 1.0 MHz		C_{CB}		8.0		pF
Emitter - base capacitance	V_{EB} = 5.0 V, f = 1.0 MHz		C_{EB}		38		pF
Thermal resistance			R_{th}		250		K/W

Coupler

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Coupling capacitance			C_C		0.6		pF
Current Transfer Ratio	I_F = 10 mA, V_{CE} = 10 V, R_{BE} = 1.0 MΩ		I_C/I_F	20			%
Collector-emitter, saturation voltage	I_F = 10 mA, I_C = 0.5 mA, R_{BE} = 1.0 MΩ		V_{CEsat}		0.25	0.4	V
Collector-emitter leakage current	V_{CE} = 200 V, R_{BE} = 1.0 MΩ	H11D1	I_{CER}			100	nA
		H11D2	I_{CER}			100	nA
	V_{CE} = 300 V, R_{BE} = 1.0 MΩ, T_A = 100 °C	H11D1	I_{CER}			250	μA
		H11D2	I_{CER}			250	μA

Current Transfer Ratio

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Current Transfer Ratio	I_F = 10 mA, V_{CE} = 10 V, R_{BE} = 1.0 MΩ	CTR	20			%

Switching Characteristics

Switching times measurement-test circuit and waveforms

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Turn-on time	I_C = 2.0 mA (to be adjusted by varying I_F), R_L = 100 Ω, V_{CC} = 10 V	t_{on}		5.0		μs
Rise time	I_C = 2.0 mA (to be adjusted by varying I_F), R_L = 100 Ω, V_{CC} = 10 V	t_r		2.5		μs
Turn-off time	I_C = 2.0 mA (to be adjusted by varying I_F), R_L = 100 Ω, V_{CC} = 10 V	t_{off}		6.0		μs
Fall time	I_C = 2.0 mA (to be adjusted by varying I_F), R_L = 100 Ω, V_{CC} = 10 V	t_f		5.5		μs

Typical Characteristics (Tamb = 25 °C unless otherwise specified)

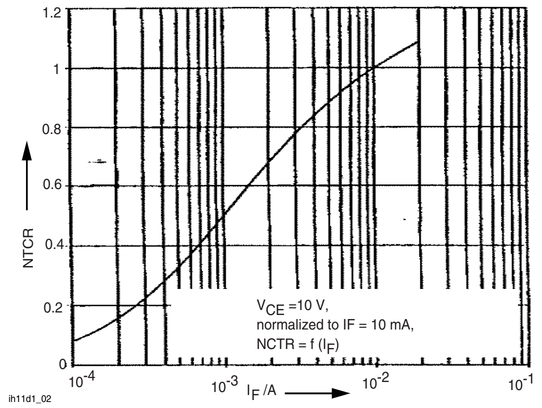


Figure 1. Current Transfer Ratio (typ.)

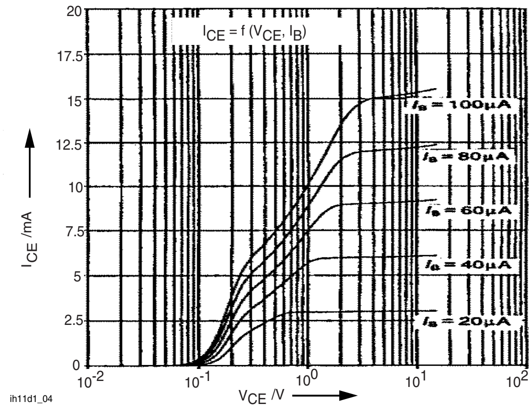


Figure 3. Output Characteristics

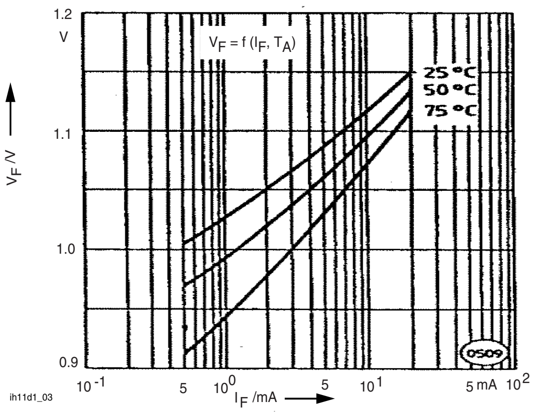


Figure 2. Diode Forward Voltage (typ.)

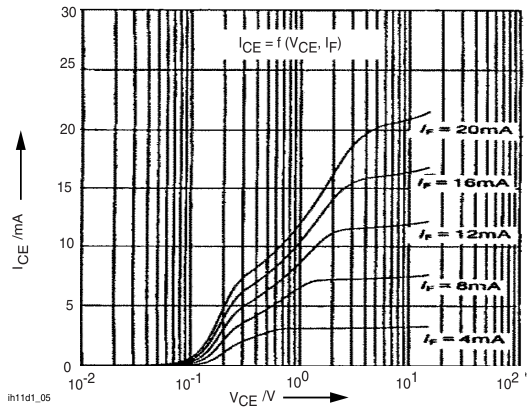


Figure 4. Output Characteristics

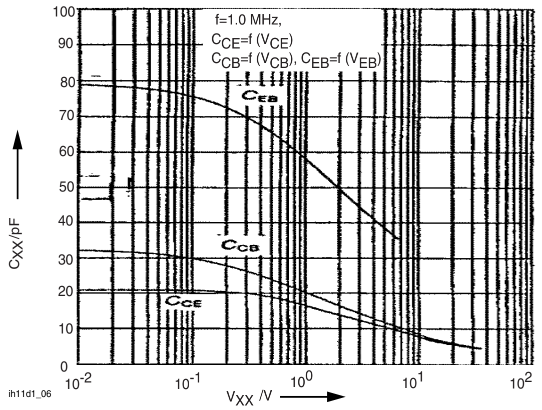


Figure 5. Transistor Capacitances (typ.)

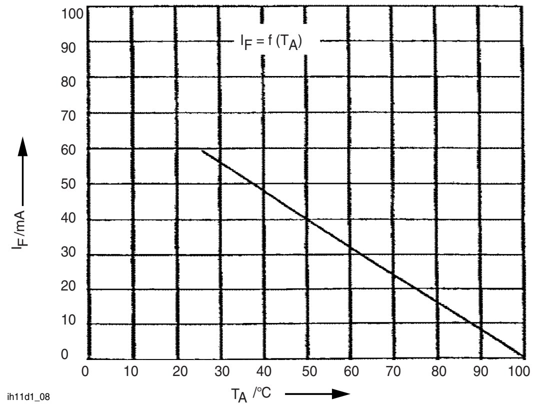


Figure 7. Permissible Loss Diode

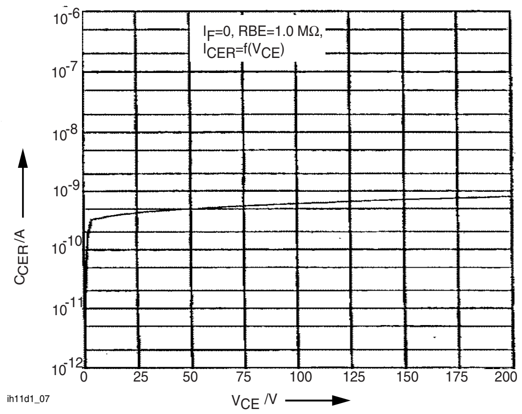


Figure 6. Collector-Emitter Leakage Current (typ.)

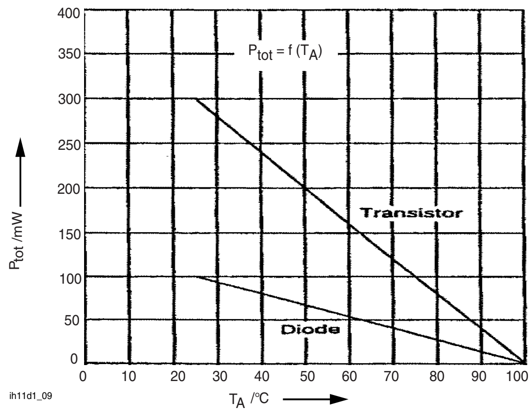


Figure 8. Permissible Power Dissipation

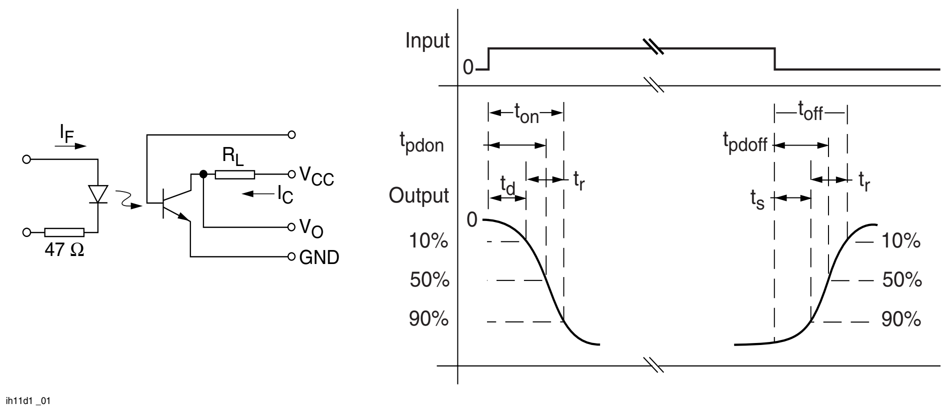
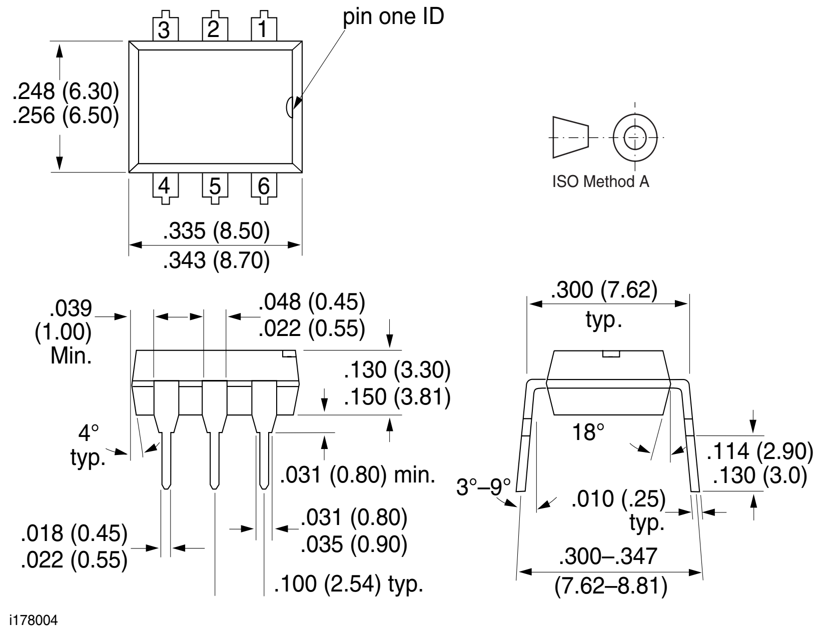
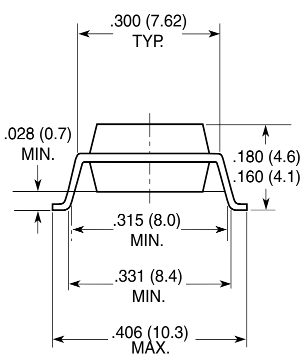


Figure 9. Switching Times Measurement-Test Circuit and Waveform

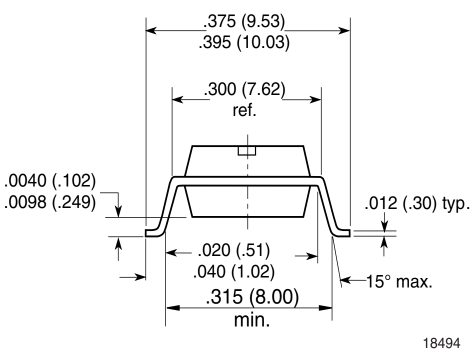
Package Dimensions in Inches (mm)



Option 7



Option 9



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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