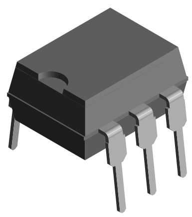
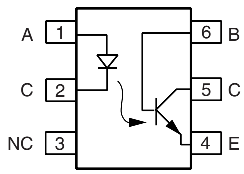
Optocoupler, Phototransistor Output, With Base Connection, High BV_{CER} Voltage





i179004

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

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.

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

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)

Note
For additional information on the available options refer to option information.

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**VALUE**	**UNIT**
INPUT					
Reverse voltage			V_R	6	V
DC forward current			I_F	60	mA
Surge forward current	$t \leq 10$ µs		I_{FSM}	2.5	A
Power dissipation			P_{diss}	100	mW
OUTPUT					
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	V
Collector current			I_C	100	mA
Power dissipation			P_{diss}	300	mW
COUPLER					
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	mm
Clearance distance				≥ 7	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}	$\geq 10^{12}$	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C		R_{IO}	$\geq 10^{11}$	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 s, dip soldering: distance to seating plane ≥ 1.5 mm		T_{sld}	260	°C

Note

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.

ELECTRICAL CHARACTERISTCS							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT							
Forward voltage	I_F = 10 mA		V_F		1.1	1.5	V
Reverse voltage	I_R = 10 µA		V_R	6			V
Reverse current	V_R = 6 V		I_R		0.01	10	µA
Capacitance	V_R = 0 V, f = 1 MHz		C_O		25		pF
Thermal resistance			R_{thJA}		750		K/W
OUTPUT							
Collector emitter breakdown voltage	I_{CE} = 1 mA, R_{BE} = 1 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			V
Collector emitter capacitance	V_{CE} = 10 V, f = 1 MHz		C_{CE}		7		pF
Collector base capacitance	V_{CB} = 10 V, f = 1 MHz		C_{CB}		8		pF
Emitter base capacitance	V_{EB} = 5 V, f = 1 MHz		C_{EB}		38		pF
Thermal resistance			R_{th}		250		K/W
COUPLER							
Coupling capacitance			C_C		0.6		pF
Current transfer ratio	I_F = 10 mA, V_{CE} = 10 V, R_{BE} = 1 MΩ		I_C/I_F	20			%
Collector emitter, saturation voltage	I_F = 10 mA, I_C = 0.5 mA, R_{BE} = 1 MΩ		V_{CEsat}		0.25	0.4	V
Collector emitter, leakage current	V_{CE} = 200 V, R_{BE} = 1 MΩ	H11D1	I_{CER}			100	nA
		H11D2	I_{CER}			100	nA
	V_{CE} = 300 V, R_{BE} = 1 MΩ, T_{amb} = 100 °C	H11D1	I_{CER}			250	µA
		H11D2	I_{CER}			250	µA

Note

T_{amb} = 25 °C, unless otherwise specified.
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							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Current transfer ratio	I_F = 10 mA, V_{CE} = 10 V, R_{BE} = 1 MΩ		CTR	20			%

SWITCHING CHARACTERISTICS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Turn-on time	I_C = 2 mA (to be adjusted by varying I_F), R_L = 100 Ω, V_{CC} = 10 V	t_{on}		5		µs
Rise time	I_C = 2 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 mA (to be adjusted by varying I_F), R_L = 100 Ω, V_{CC} = 10 V	t_{off}		6		µs
Fall time	I_C = 2 mA (to be adjusted by varying I_F), R_L = 100 Ω, V_{CC} = 10 V	t_f		5.5		µs

Note

Switching times measurement-test circuit and waveforms

TYPICAL CHARACTERISTICS

T_{amb} = 25 °C, unless otherwise specified

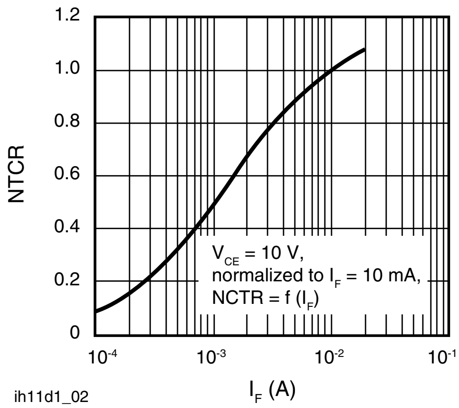


Fig. 1 - Current Transfer Ratio (typ.)

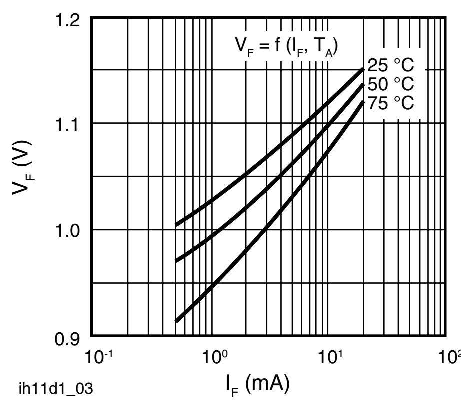


Fig. 2 - Diode Forward Voltage (typ.)

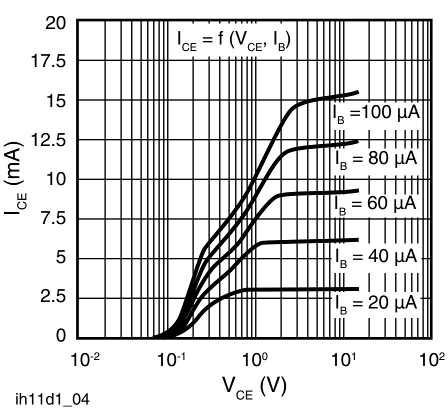


Fig. 3 - Output Characteristics

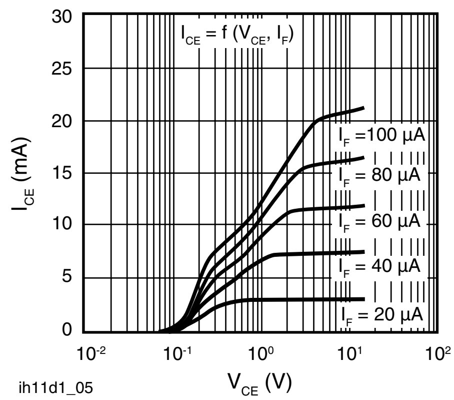


Fig. 4 - Output Characteristics

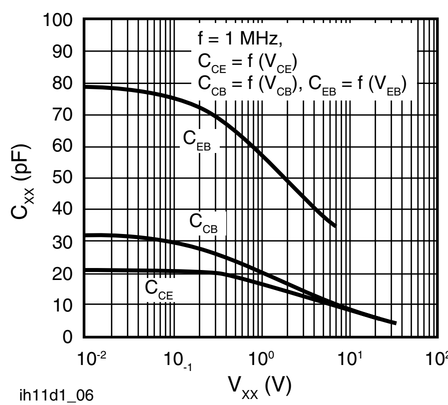


Fig. 5 - Transistor Capacitances (typ.)

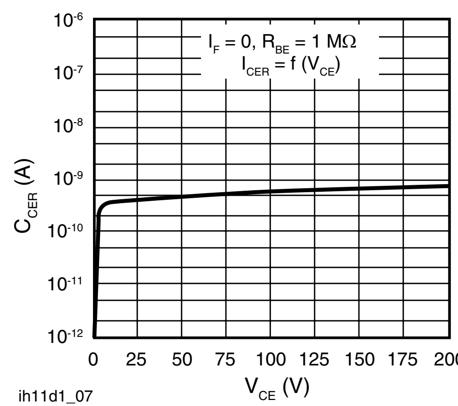


Fig. 6 - Collector Emitter Leakage Current (typ.)

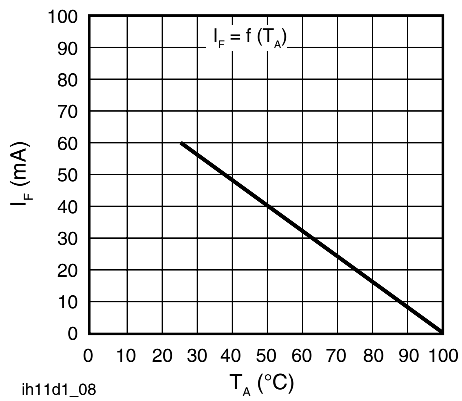


Fig. 7 - Permissible Loss Diode

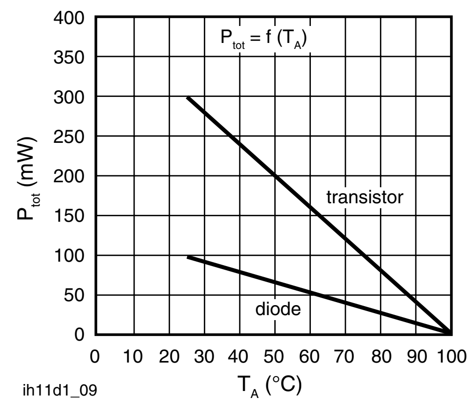


Fig. 8 - Permissible Power Dissipation

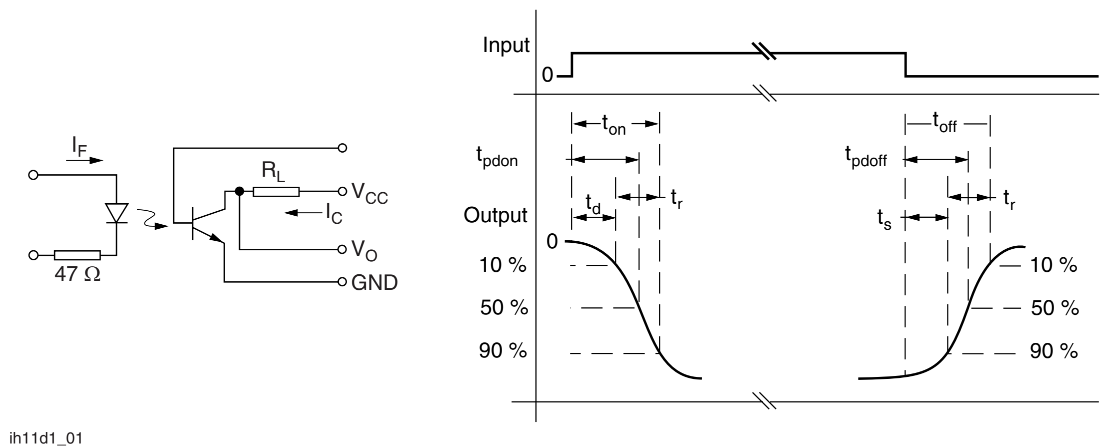
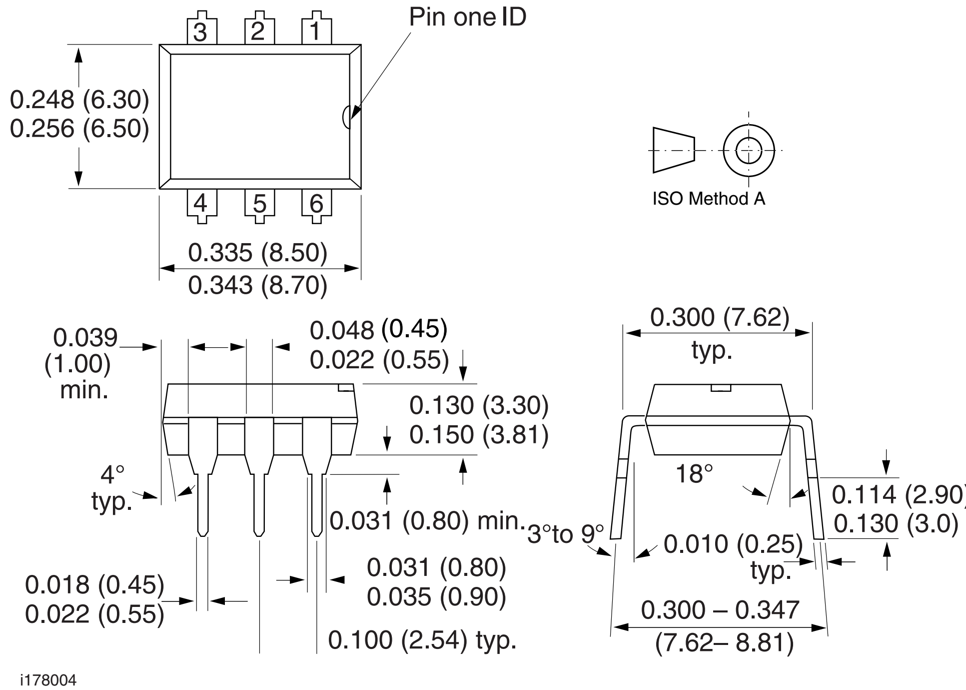
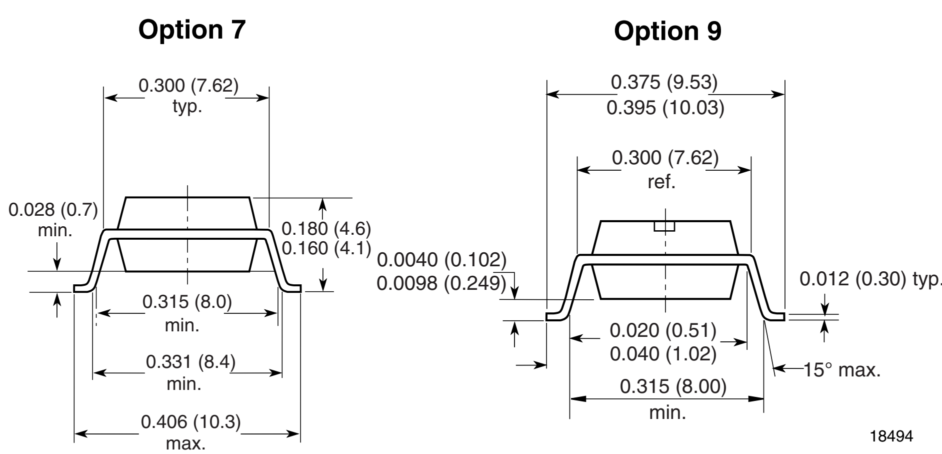


Fig. 9 Switching Times Measurement-Test Circuit and Waveform

PACKAGE DIMENSIONS in inches (millimeters)





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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 operating systems 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.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany

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