SIEMENS

H11D1/H11D2/H11D3
PHOTOTRANSISTOR, 5.3 KV, TRIOS®
HIGH BV_{CER} VOLTAGE
OPTOCOUPLER

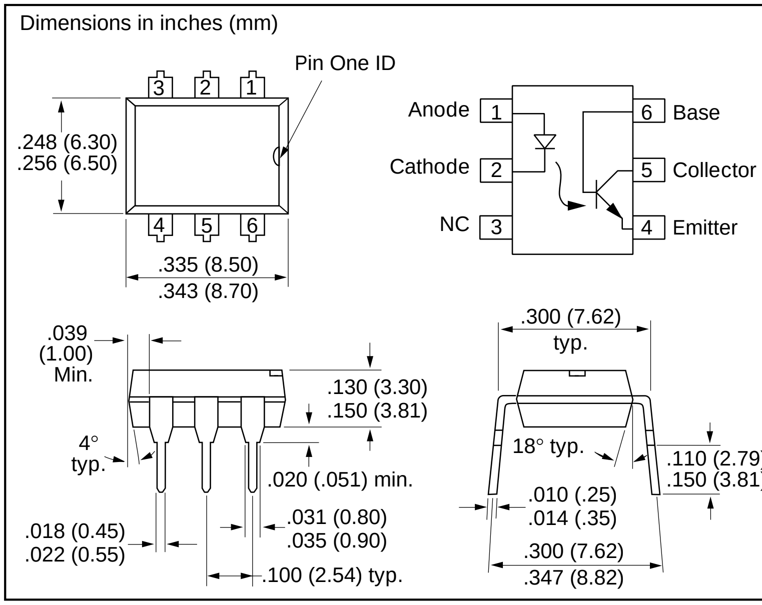
FEATURES

- **CTR at I_F=10 mA, BV_{CER}=10 V: ≥20%**
- **Good CTR Linearity with Forward Current**
- **Low CTR Degradation**
- **Very High Collector-Emitter Breakdown Voltage**
  - **H11D1/H11D2, BV_{CER}=300 V**
  - **H11D3, BV_{CER}=200 V**
- **Isolation Test Voltage: 5300 VAC_{RMS}**
- **Low Coupling Capacitance**
- **High Common Mode Transient Immunity**
- **Phototransistor Optocoupler in 6 Pin DIP Package with Base Connection**
- **Field Effect Stable: TRIOS***
- **VDE 0884 Available with Option 1**
- **Underwriters Lab File #E52744**
- **Applications**
  - **Telecommunications**
  - **Replace Relays**

DESCRIPTION

The H11D1/2/3 are optocouplers with very high BV_{CER}. They are intended for telecommunications applications or any DC application requiring a high blocking voltage.

***TRIOS**—**TR**ansparent **IO**n **S**hield



Maximum Ratings (T_A=25°C)

Emitter

Reverse Voltage .... 6 V
DC Forward Current .... 60 mA
Surge Forward Current (tp ≤ 10 µs) .... 2.5 A
Total Power Dissipation .... 100 mW

Detector

Collector-Emitter Voltage
  H11D1/2 .... 300 V
  H11D3 .... 200 V
Collector-Base Voltage
  H11D1/2 .... 300 V
  H11D3 .... 200 V
Emitter-Base Voltage .... 7 V
Collector Current .... 100 mA
Total Power Dissipation .... 300 mW

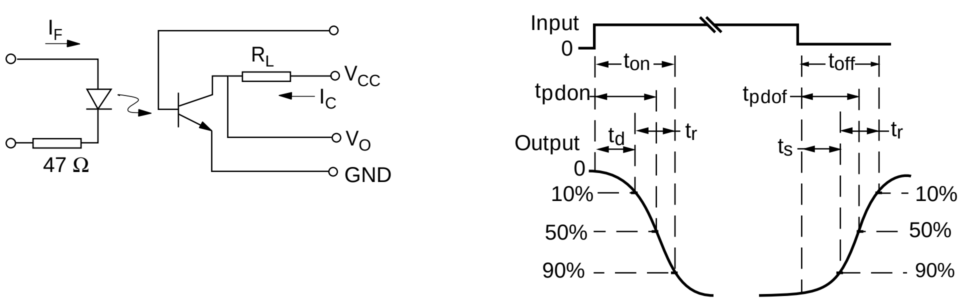
Package

Isolation Test Voltage (between emitter and detector
  refer to climate DIN 40046, part 2, Nov. 74) .... 5300 VAC_{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_A=25°C .... $\geq 10^{12}\ \Omega$
  V_{IO}=500 V, T_A=100°C .... $\geq 10^{11}\ \Omega$
Storage Temperature Range .... –55°C to +150°C
Operating Temperature Range .... –55°C to +100°C
Junction Temperature .... 100°C
Soldering Temperature (max. 10 sec.,
  dip soldering: distance to seating plane ≥ 1.5 mm) .... 260°C

Characteristics (T_A=25°C, unless otherwise specified)

	Symbol	Min	Typ	Max	Unit	Condition
Emitter						
Forward Voltage	V_F		1.1	1.5	V	I_F=10 mA
Reverse Voltage	V_R	6			V	I_R=10 mA
Reverse Current	I_R		0.01	10	mA	V_R=6 V
Capacitance	C_O		25		pF	V_R=0 V,f=1 MHz
Thermal Resistance	R_{thJA}		750		K/W	
Detector						
Voltage, Collector-Emitter H11D1/H11D2 H11D3 Voltage, Emitter-Base	BV_{CER} BV_{EBO}	 300 200 7			 V V V	I_{CE}=1 mA, R_{BE}=1 MΩ I_{EB}=100 µA
Capacitance	C_{CE} C_{CB} C_{EB}		7 8 38		pF pF pF	V_{CE}=10 V, f=1 MHz V_{CB}=10 V, f=1 MHz V_{EB}=5 V, f=1 MHz
Thermal Resistance	R_{thJA}		250		K/W	
Package						
Coupling Capacitance	C_C		0.6		pF	
Coupling Transfer Ratio	I_C/I_F	20			%	I_F=10 mA, V_{CE}=10 V, R_{BE}=1 MΩ
Collector-Emitter, Saturation Voltage	V_{CEsat}		0.25	0.4	V	I_F=10 mA, I_C=0.5 mA, R_{BE}=1 MΩ
Leakage Current, Collector-Emitter H11D1/H11D2 H11D3 Leakage Current, Collector-Emitter H11D1/H11D2 H11D3	I_{CER} I_{CER} 			 100 100 250 250	 nA nA µA µA	 V_{CE}=200 V, R_{BE}=1 MΩ V_{CE}=100 V, R_{BE}=1 MΩ V_{CE}=200 V, R_{BE}=1 MΩ, T_A=100°C V_{CE}=100 V, R_{BE}=1 MΩ, T_A=100°C

Figure 1. Switching times measurement-test circuit and waveforms



Switching Times (typ.)
I_C=2 mA (to be adjusted by varying I_F), R_L=100Ω,
T_A=25°C, V_{CC}=10 V

Description	Symbol	Values	Unit
Turn-On Time	t_{ON}	5	µs
Rise Time	t_R	2.5	µs
Turn-Off Time	t_{OFF}	6	µs
Fall Time	t_F	5.5	µs

Figure 2. Current transfer ratio (typ.) V_{CE}=10 V, T_A=25°C, normalized to I_F=10 mA, NCTR=f(I_F)

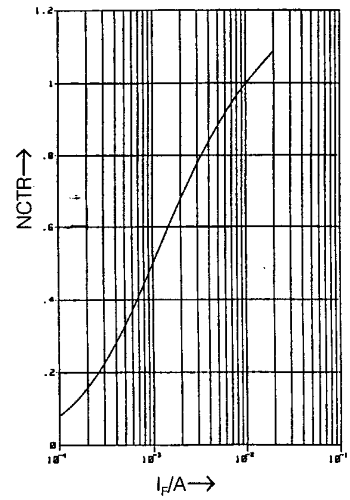


Figure 3. Diode forward voltage (typ.) V_F=f(I_F,T_A)

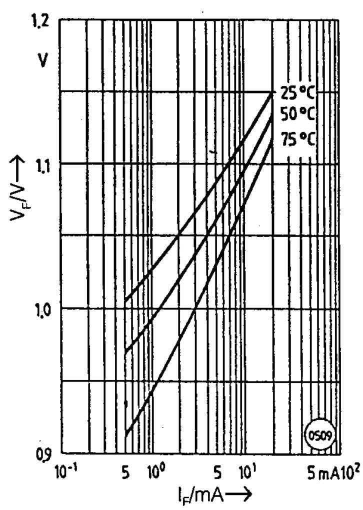


Figure 4. Output characteristics (typ.) T_A=25°C, I_{CE}=f(V_{CE}, I_B)

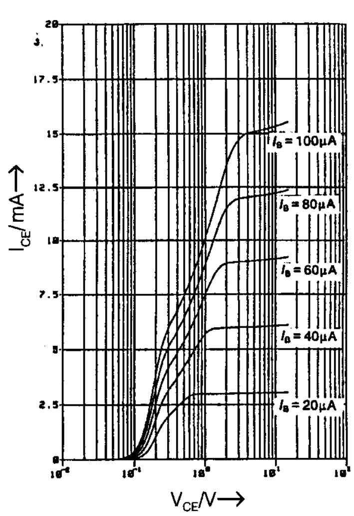


Figure 5. Output characteristics (typ.) T_A=25°C, I_{CE}=f(V_{CE}, I_F)

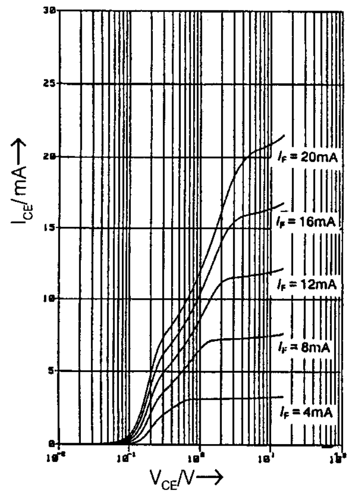


Figure 6. Transistor capacitances (typ.) T_A=25°C, f=1 MHz, C_{CE}=f(V_{CE}) C_{CB}=f (V_{CB}), C_{EB}=f (V_EB)

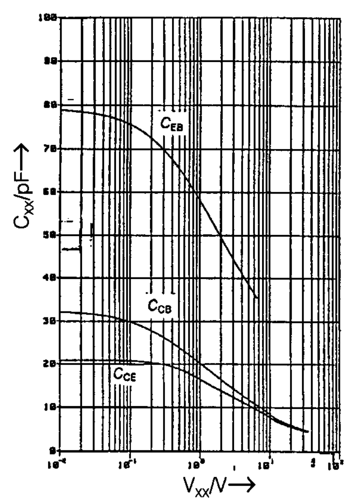


Figure 7. Collector-emitter leakage current (typ.) I_F=0, R_{BE}=1 MΩ, I_{CER}=f(V_{CE})

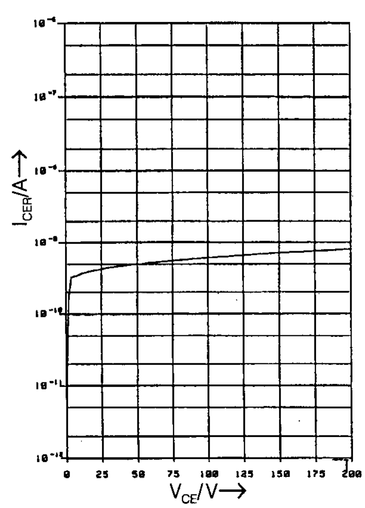


Figure 8. Permissible loss diode I_F= f(T_A)

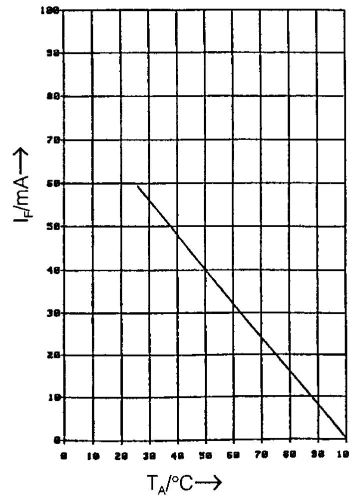


Figure 9. Permissible power dissipation P_{IOT}=f(T_A)