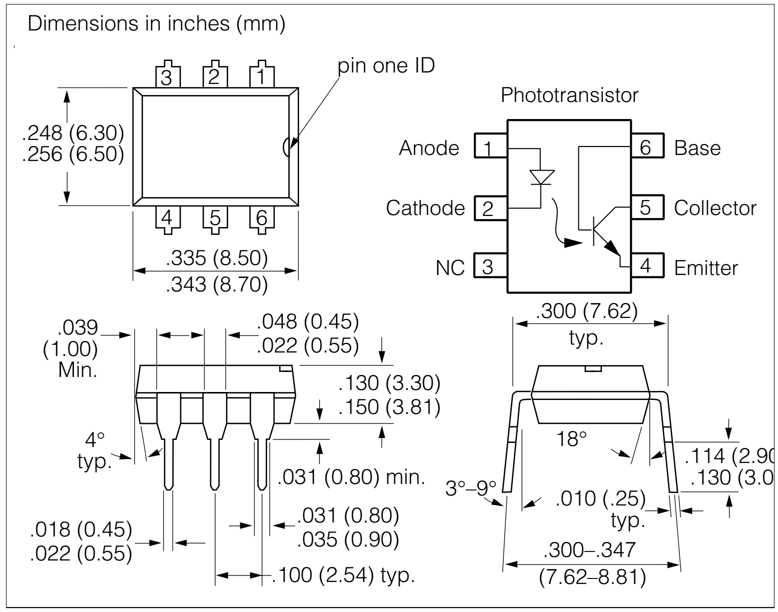
H11D1/H11D2/H11D3/H11D4

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/H11D4, BV_{CER}=200 V**
- **Isolation Test Voltage: 5300 V_{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 H11D1/2/3/4 are optocouplers with very high BV_{CER}. They are intended for telecommunications applications or any DC application requiring a high blocking voltage.

The H11D1/D2 are identical and the H11D3/D4 are identical.

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

Maximum Ratings T_A=25°C

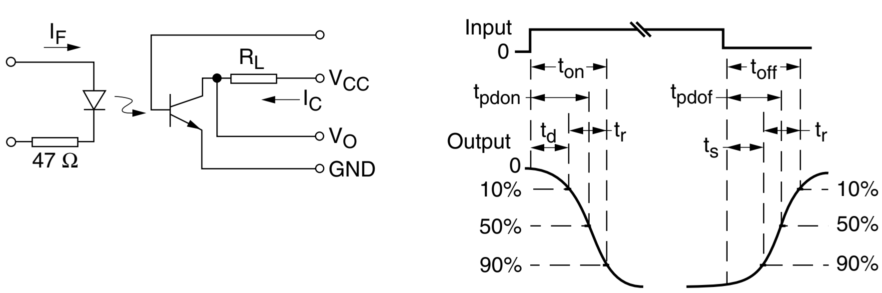
Emitter

Reverse Voltage	6.0 V
DC Forward Current	60 mA
Surge Forward Current (t ≤10 µs)	2.5 A
Total Power Dissipation	100 mW
Detector	
Collector-Emitter Voltage	
H11D1/2	300 V
H11D3 /4	200 V
Collector-Base Voltage	
H11D1/2	300 V
H11D3 /4	200 V
Emitter-Base Voltage	7.0 V
Collector Current	100 mA
Total Power Dissipation	300 mW
Package	
Isolation Test Voltage (between emitter and detector, refer to climate DIN 50014, part 2, Nov. 74)	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_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)

Parameter		Symbol	Min	Typ	Max	Unit	Condition
Emitter							
Forward Voltage		V_F	—	1.1	1.5	V	I_F=10 mA
Reverse Voltage		V_R	6.0	—	—		I_R=10 µA
Reverse Current		I_R	—	0.01	10	µA	V_R=6.0 V
Capacitance		C_O	—	25	—	pF	V_R=0 V, f=1.0 MHz
Thermal Resistance		R_{thJA}	—	750	—	K/W	—
Detector							
Voltage, Collector-Emitter	H11D1/H11D2	BV_{CER}	300	—	—	V	I_{CE}=1.0 mA, R_{BE}=1.0 MΩ
	H11D3/H11D4		200	—	—	—	—
Voltage, Emitter-Base		BV_{EBO}	7.0	—	—	—	I_{EB}=100 µA
Capacitance		C_{CE}	—	7.0	—	pF	V_{CE}=10 V, f=1.0 MHz
		C_{CB}	—	8.0	—	pF	V_{CB}=10 V, f=1.0 MHz
		C_{EB}	—	38	—	pF	V_{EB}=5.0 V, f=1.0 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}=1.0 MΩ
Collector-Emitter, Saturation Voltage		V_{CEsat}	—	0.25	0.4	V	I_F=10 mA, I_C=0.5 mA, R_{BE}=1.0 MΩ
Leakage Current, Collector-Emitter	H11D1/H11D2	I_{CER}	—	—	100	nA	V_{CE}=200 V, R_{BE}=1.0 MΩ
	H11D3/H11D4		—	—	—	—	V_{CE}=100 V, R_{BE}=1.0 MΩ
	H11D1/H11D2		—	—	250	µA	V_{CE}=300 V, R_{BE}=1.0 MΩ, T_A=100°C
	H11D3/H11D4		—	—	—	—	V_{CE}=100 V, R_{BE}=1.0 MΩ, T_A=100°C

Figure 1. Switching times measurement-test circuit and waveforms



Switching Times (typ.)

I_C=2.0 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}	5.0	µs
Rise Time	t_r	2.5	
Turn-Off Time	t_{OFF}	6.0	
Fall Time	t_f	5.5	

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

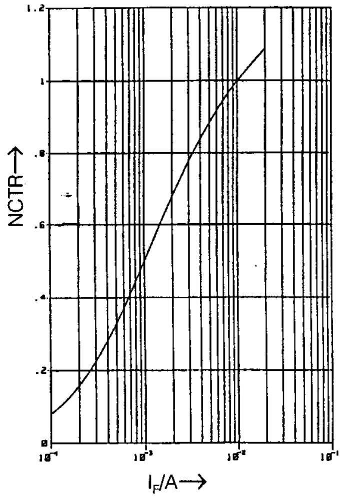


Figure 3. Diode forward voltage (typ.) V_F=f(I_F T_A)

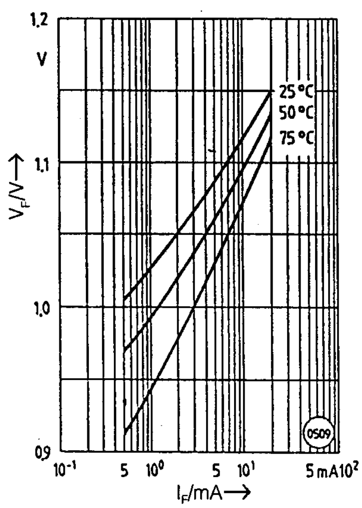


Figure 4. Output characteristics (typ.) T_A=25°C, I_{CE}=f(V_{CE}, I_B)

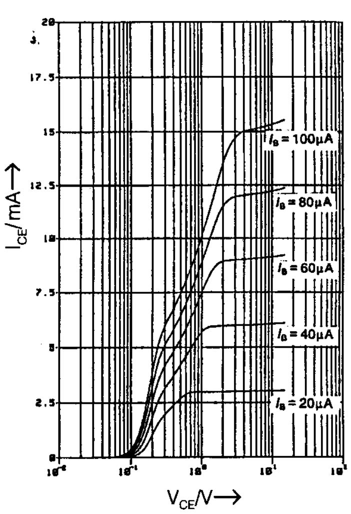


Figure 5. Output characteristics (typ.) T_A=25°C, I_{CE}=f(V_{CE}, I_F)

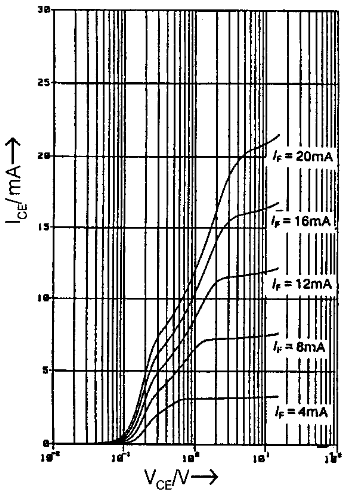


Figure 6. Transistor capacitances (typ.) T_A=25°C, f=1.0 MHz, C_{CE}=f(V_{CE}) C_{CB}=f (V_{CB}), C_{EB}=f (V_{EB})

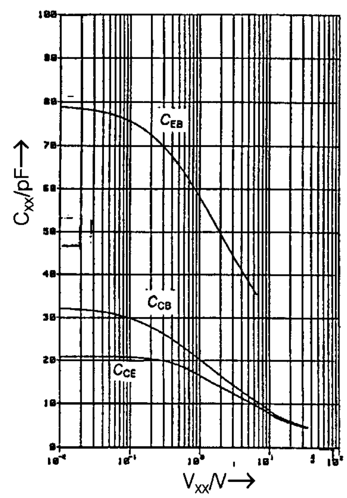


Figure 7. Collector-emitter leakage current (typ.) I_F=0, R_{BE}=1.0 MΩ, I_{CER}=f(V_{CE})

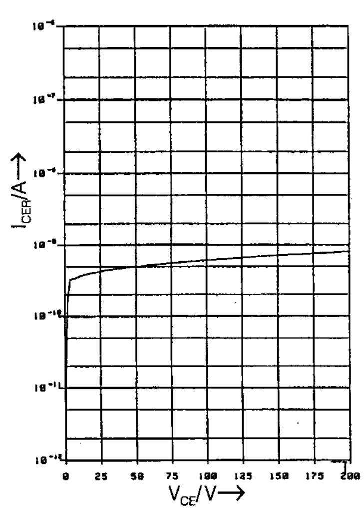


Figure 8. Permissible loss diode I_F= f(T_A)

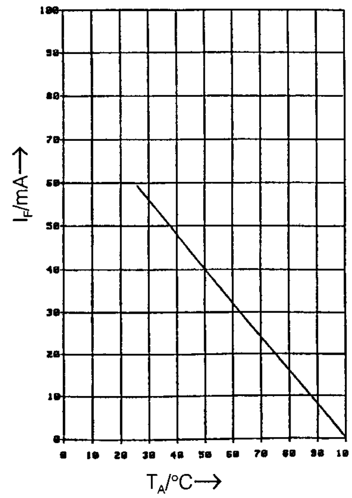


Figure 9. Permissible power dissipation P_{tot}=f(T_A)