



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: $\geq 20\%$
- 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

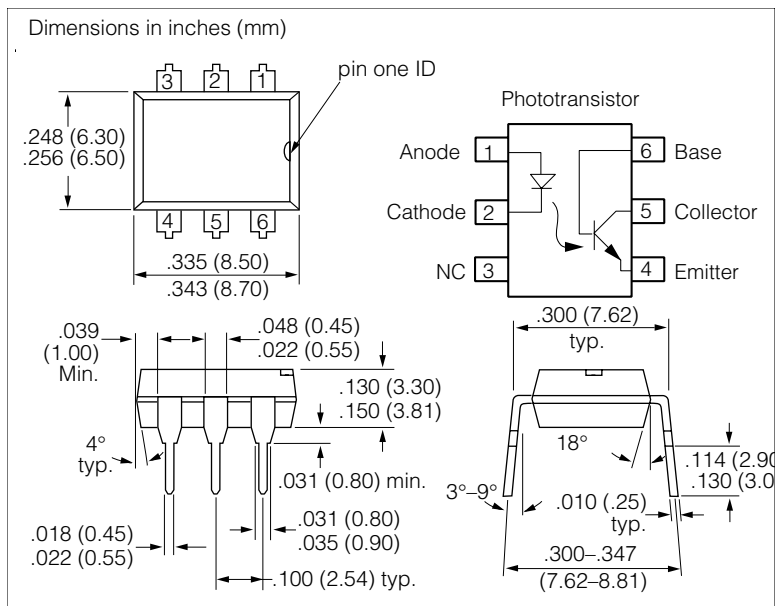
- Telecommunications
- Replace Relays

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—TRansparent IO n Shield



Maximum Ratings $T_A=25^\circ\text{C}$

Emitter

Reverse Voltage.....	6.0 V
DC Forward Current.....	60 mA
Surge Forward Current ($t \leq 10 \mu\text{s}$).....	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

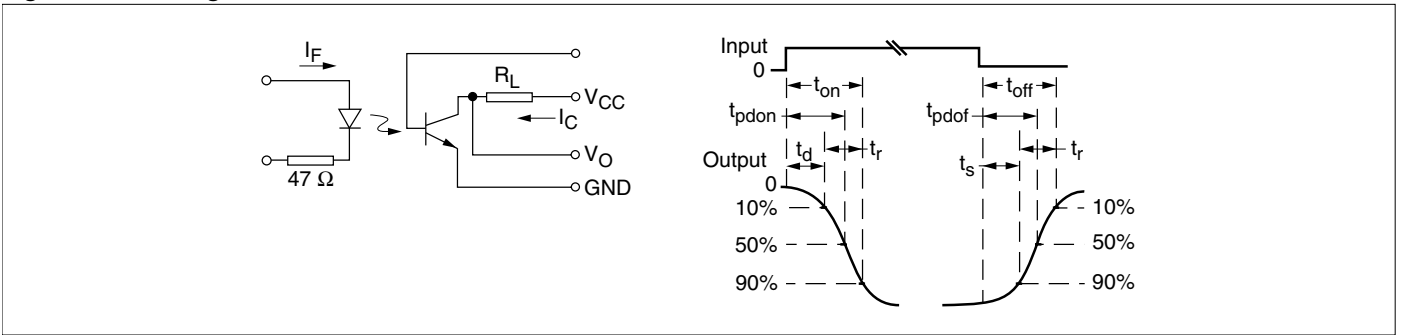
Package

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, $T_A=25^\circ\text{C}$	$\geq 10^{12} \Omega$
$V_{IO}=500$ V, $T_A=100^\circ\text{C}$	$\geq 10^{11} \Omega$
Storage Temperature Range.....	-55°C to $+150^\circ\text{C}$
Operating Temperature Range	-55°C to $+100^\circ\text{C}$
Junction Temperature	100°C
Soldering Temperature (max. 10 sec., dip soldering: distance to seating plane ≥ 1.5 mm)	260°C

Characteristics $T_A=25^{\circ}\text{C}$, unless otherwise specified)

Parameter		Symbol	Min	Typ	Max	Unit	Condition
Emitter							
Forward Voltage		V_F	—	1.1	1.5	V	$I_F=10\text{ mA}$
Reverse Voltage		V_R	6.0	—	—		$I_R=10\text{ }\mu\text{A}$
Reverse Current		I_R	—	0.01	10	μA	$V_R=6.0\text{ V}$
Capacitance		C_O	—	25	—	pF	$V_R=0\text{ V}$, $f=1.0\text{ MHz}$
Thermal Resistance		R_{thJA}	—	750	—	K/W	—
Detector							
Voltage, Collector-Emitter	H11D1/H11D2	BV_{CER}	300	—	—	V	$I_{CE}=1.0\text{ mA}$, $R_{BE}=1.0\text{ M}\Omega$
	H11D3/H11D4		200	—	—	—	—
Voltage, Emitter-Base		BV_{EBO}	7.0	—	—	—	$I_{EB}=100\text{ }\mu\text{A}$
Capacitance		C_{CE}	—	7.0	—	pF	$V_{CE}=10\text{ V}$, $f=1.0\text{ MHz}$
		C_{CB}	—	8.0	—	pF	$V_{CB}=10\text{ V}$, $f=1.0\text{ MHz}$
		C_{EB}	—	38	—	pF	$V_{EB}=5.0\text{ V}$, $f=1.0\text{ MHz}$
Thermal Resistance		R_{thJA}	—	250	—	K/W	—
Package							
Coupling Capacitance		C_C	—	0.6	—	pF	—
Coupling Transfer Ratio		I_C/I_F	20	—	—	%	$I_F=10\text{ mA}$, $V_{CE}=10\text{ V}$, $R_{BE}=1.0\text{ M}\Omega$
Collector-Emitter, Saturation Voltage		V_{CEsat}	—	0.25	0.4	V	$I_F=10\text{ mA}$, $I_C=0.5\text{ mA}$, $R_{BE}=1.0\text{ M}\Omega$
Leakage Current, Collector-Emitter	H11D1/H11D2	I_{CER}	—	—	100	nA	$V_{CE}=200\text{ V}$, $R_{BE}=1.0\text{ M}\Omega$
	H11D3/H11D4		—	—	—	—	$V_{CE}=100\text{ V}$, $R_{BE}=1.0\text{ M}\Omega$
	H11D1/H11D2		—	—	250	μA	$V_{CE}=300\text{ V}$, $R_{BE}=1.0\text{ M}\Omega$, $T_A=100^{\circ}\text{C}$
	H11D3/H11D4		—	—	—	—	$V_{CE}=100\text{ V}$, $R_{BE}=1.0\text{ M}\Omega$, $T_A=100^{\circ}\text{C}$

Figure 1. Switching times measurement-test circuit and waveforms



Switching Times (typ.)

$I_C=2.0\text{ mA}$ (to be adjusted by varying I_F), $R_L=100\Omega$,
 $T_A=25^{\circ}\text{C}$, $V_{CC}=10\text{ V}$

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.) $V_{CE}=10\text{ V}$, $T_A=25^\circ\text{C}$, normalized to $I_F=10\text{ mA}$, $NCTR=f(I_F)$

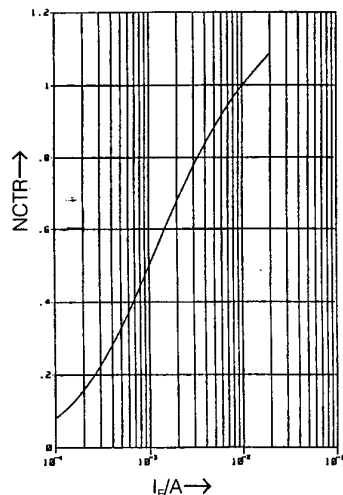


Figure 3. Diode forward voltage (typ.) $V_F=f(I_F, T_A)$

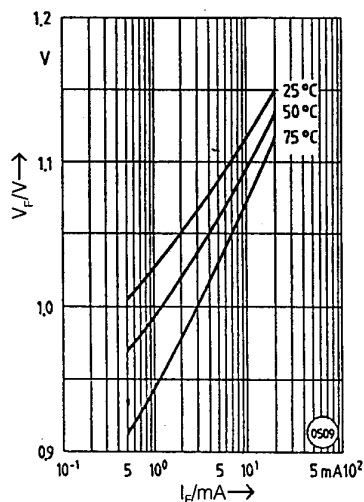


Figure 4. Output characteristics (typ.) $T_A=25^\circ\text{C}$, $I_{CE}=f(V_{CE}, I_B)$

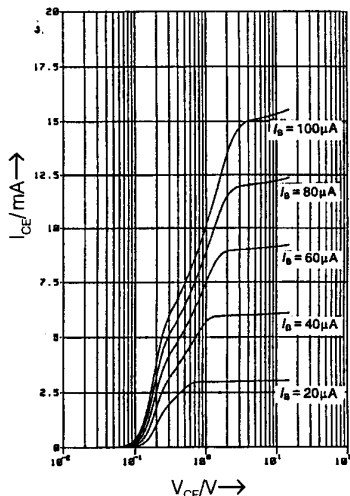


Figure 5. Output characteristics (typ.) $T_A=25^\circ\text{C}$, $I_{CE}=f(V_{CE}, I_F)$

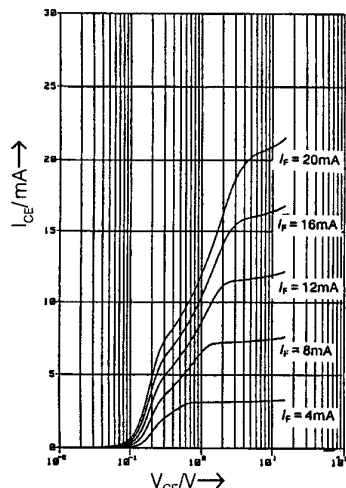


Figure 6. Transistor capacitances (typ.) $T_A=25^\circ\text{C}$, $f=1.0\text{ MHz}$, $C_{CE}=f(V_{CE})$, $C_{CB}=f(V_{CB})$, $C_{EB}=f(V_{EB})$

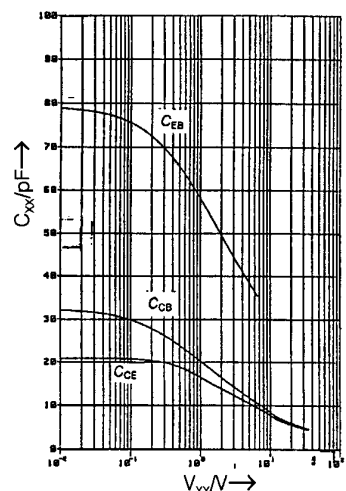


Figure 7. Collector-emitter leakage current (typ.) $I_F=0$, $R_{BE}=1.0\text{ M}\Omega$, $I_{CER}=f(V_{CE})$

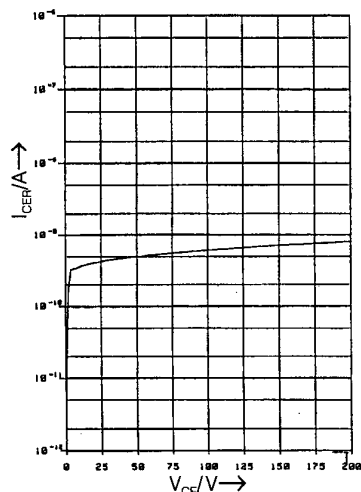


Figure 8. Permissible loss diode $I_F=f(T_A)$

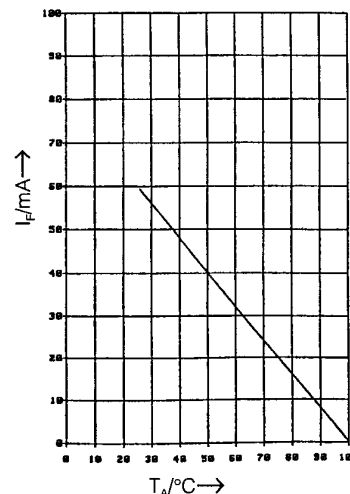


Figure 9. Permissible power dissipation $P_{tot}=f(T_A)$

