


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

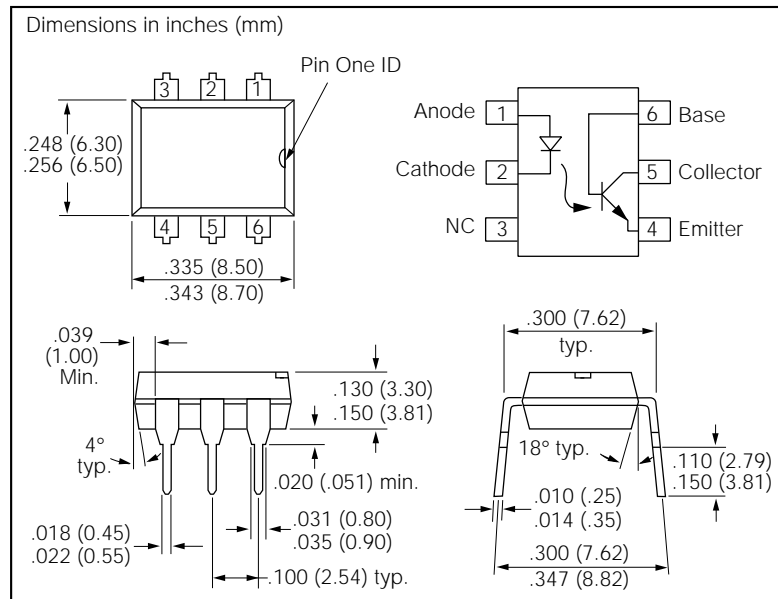
FEATURES

- 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, $BV_{CER}=200$ 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—TRansparent IO n Shield



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

Emitter

Reverse Voltage	6 V
DC Forward Current	60 mA
Surge Forward Current ($t_p \leq 10 \mu\text{s}$)	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

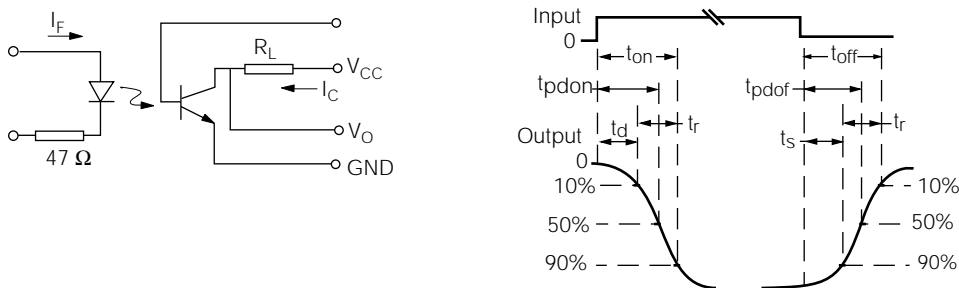
Package

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, $T_A=25^\circ\text{C}$	$\geq 10^{12} \Omega$
$V_{IO}=500$ 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)

	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			V	$I_R=10\text{ mA}$
Reverse Current	I_R		0.01	10	mA	$V_R=6\text{ V}$
Capacitance	C_O		25		pF	$V_R=0\text{ V}, f=1\text{ MHz}$
Thermal Resistance	R_{thJA}		750		K/W	
Detector						
Voltage, Collector-Emitter H11D1/H11D2	BV_{CER}	300			V	$I_{CE}=1\text{ mA}, R_{BE}=1\text{ M}\Omega$
H11D3		200			V	
Voltage, Emitter-Base	BV_{EBO}	7			V	$I_{EB}=100\text{ }\mu\text{A}$
Capacitance	C_{CE} C_{CB} C_{EB}		7 8 38		pF pF pF	$V_{CE}=10\text{ V}, f=1\text{ MHz}$ $V_{CB}=10\text{ V}, f=1\text{ MHz}$ $V_{EB}=5\text{ V}, f=1\text{ MHz}$
Thermal Resistance	R_{thJA}		250		K/W	
Package						
Coupling Capacitance	C_C		0.6		pF	
Coupling Transfer Ratio	I_C/I_F	20			%	$I_F=10\text{ mA}, V_{CE}=10\text{ V}, R_{BE}=1\text{ M}\Omega$
Collector-Emitter, Saturation Voltage	V_{CEsat}		0.25	0.4	V	$I_F=10\text{ mA}, I_C=0.5\text{ mA}, R_{BE}=1\text{ M}\Omega$
Leakage Current, Collector-Emitter H11D1/H11D2	I_{CER}			100	nA	$V_{CE}=200\text{ V}, R_{BE}=1\text{ M}\Omega$
H11D3				100	nA	$V_{CE}=100\text{ V}, R_{BE}=1\text{ M}\Omega$
Leakage Current, Collector-Emitter H11D1/H11D2	I_{CER}			250	μA	$V_{CE}=200\text{ V}, R_{BE}=1\text{ M}\Omega, T_A=100^\circ\text{C}$
H11D3				250	μA	$V_{CE}=100\text{ V}, R_{BE}=1\text{ M}\Omega, T_A=100^\circ\text{C}$

Figure 1. Switching times measurement-test circuit and waveforms



Switching Times (typ.)

$I_C=2\text{ mA}$ (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	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.) $V_{CE}=10\text{ V}$, $T_A=25^\circ\text{C}$, normalized to $I_F=10\text{ mA}$, $NCTR=f(I_F)$

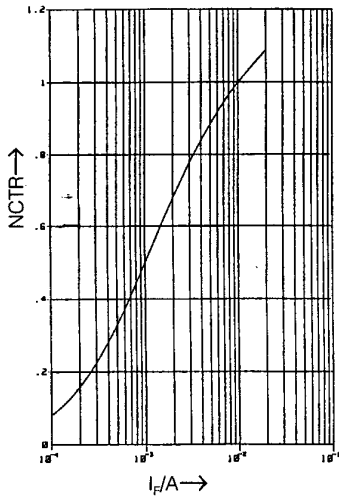


Figure 3. Diode forward voltage (typ.) $V_F=f(I_F, T_A)$

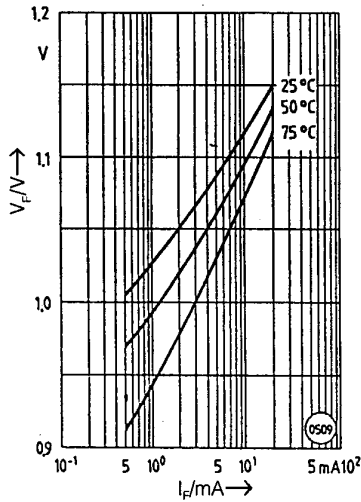


Figure 4. Output characteristics (typ.) $T_A=25^\circ\text{C}$, $I_{CE}=f(V_{CE}, I_B)$

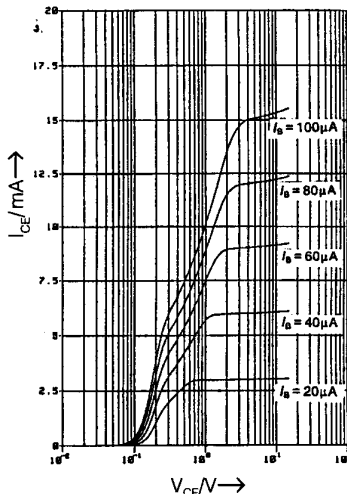


Figure 5. Output characteristics (typ.) $T_A=25^\circ\text{C}$, $I_{CE}=f(V_{CE}, I_F)$

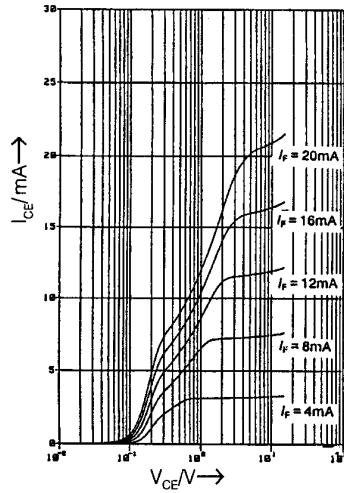


Figure 6. Transistor capacitances (typ.) $T_A=25^\circ\text{C}$, $f=1\text{ MHz}$, $C_{CE}=f(V_{CE})$, $C_{CB}=f(V_{CB})$, $C_{EB}=f(V_{EB})$

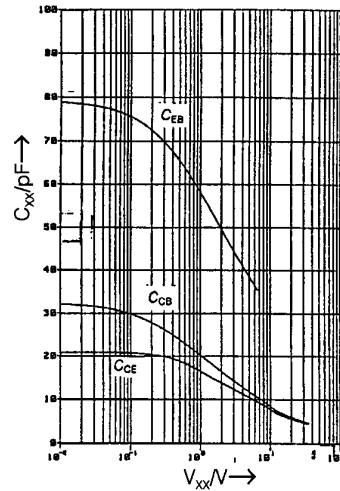


Figure 7. Collector-emitter leakage current (typ.) $I_F=0$, $R_{BE}=1\text{ M}\Omega$, $I_{CER}=f(V_{CE})$

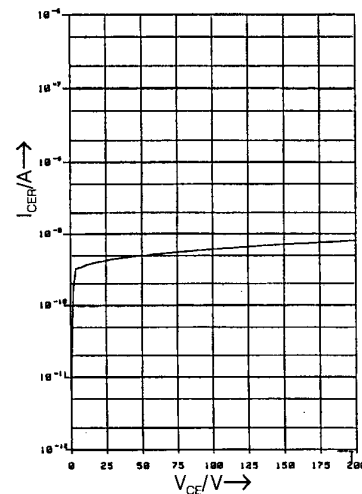


Figure 8. Permissible loss diode $I_F=f(T_A)$

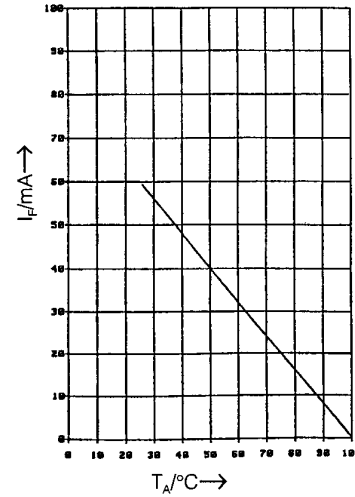


Figure 9. Permissible power dissipation $P_{TOT}=f(T_A)$

