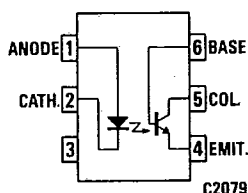
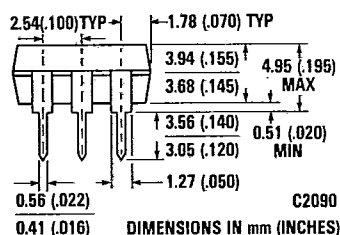
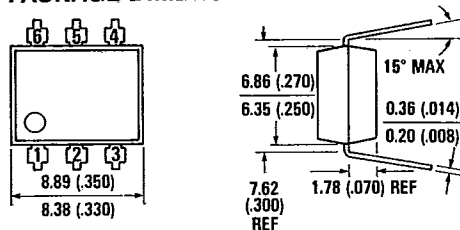


**GENERAL  
INSTRUMENT****VDE APPROVED  
TRANSISTOR OUTPUT OPTOCOUPLER**

Optocouplers

**H11A1  
H11A1Z****PACKAGE DIMENSIONS**

Equivalent Circuit

**DESCRIPTION**

The H11A1 is a phototransistor-type optically coupled isolator. An infrared emitting diode manufactured from specially grown gallium arsenide is selectively coupled with an NPN silicon phototransistor in a standard plastic six-pin dual-in-line package.

**FEATURES**

- High isolation voltage  
5300 VAC RMS — 5 seconds  
7500 VAC PEAK — 5 seconds
- Minimum current transfer ratio of 50%
- Underwriters Laboratory (UL) recognized  
File #E50151
- VDE approval Certificate 39 419 for H11A1Z

**APPLICATIONS**

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs
- Appliance sensor systems
- Industrial controls

**ABSOLUTE MAXIMUM RATINGS** ( $T_A = 25^\circ\text{C}$  Unless Otherwise Specified)**TOTAL PACKAGE**

Storage temperature	-55°C to 150°C
Operating temperature	-55°C to 100°C
Lead temperature (Soldering, 10 sec)	260°C
Total package power dissipation at 25°C (LED plus detector)	260 mW
Derate linearly from 25°C	3.5 mW/°C

**INPUT DIODE**

Forward DC current	60 mA
Reverse voltage	6 V
Peak forward current (1 $\mu\text{s}$ pulse, 300 pps)	3.0 A
Power dissipation 25°C ambient	100 mW
Derate linearly from 25°C	1.8 mW/°C

**OUTPUT TRANSISTOR**

Power dissipation at 25°C	150 mW
Derate linearly from 25°C	2.67 mW/°C
$V_{CE0}$	30 V
$V_{CBO}$	70 V
$V_{ECO}$	7 V
Collector current (continuous)	100 mA

**H11A1 H11A1Z**

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**ELECTRO-OPTICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  Unless Otherwise Specified)

TRANSFER CHARACTERISTICS						
	CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNITS TEST CONDITIONS
DC	Current Transfer Ratio collector to emitter	CTR	50			$I_F = 10\text{ mA}, V_{CE} = 10\text{ V}$
	Saturation voltage	$V_{CE(SAT)}$		0.1	0.4	$V$ $I_F = 10\text{ mA}, I_C = 0.5\text{ mA}$
SWITCHING TIMES	Non-saturated Turn-on time	$t_{on}$		2		$\mu\text{s}$ $(V_{CE} = V, I_{CE} 2\text{ mA}, R_L = 100\ \Omega)$ See Figure 9
	Turn-off time	$t_{off}$		2		$\mu\text{s}$
	Non-saturated Turn-on time	$t_{on}$		300		$\text{ns}$ $(V_{CB} = 10\text{ V}, I_{CB} 50\ \mu\text{A}, R_L = 100\ \Omega)$ See Figure 9
	Turn-off time	$t_{off}$		300		$\text{ns}$
ISOLATION	Isolation voltage	$V_{iso}$	5300			VAC RMS Relative humidity $\leq 50\%$ , $I_{I-O} \leq 10\ \mu\text{A}$ , 5 seconds
			7500			VAC PEAK Relative humidity $\leq 50\%$ , $I_{I-O} \leq 10\ \mu\text{A}$ , 5 seconds
	Isolation resistance	$R_{iso}$	$10^{11}$			ohms $V_{I-O} = 500\text{ VDC}$
	Isolation capacitance	$C_{iso}$		0.5		pF $f = 1\text{ MHz}$

INDIVIDUAL COMPONENT CHARACTERISTICS						
	CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNITS TEST CONDITIONS
INPUT DIODE	Forward voltage	$V_F$		1.1	1.50	$V$ $I_F = 10\text{ mA}$
	Forward voltage temperature coefficient			-1.8		$\text{mV}/^\circ\text{C}$
	Reverse voltage	$V_R$	3.0	25		$V$ $I_R = 10\ \mu\text{A}$
	Junction capacitance	$C_J$		50		pF $V_F = 0\text{ V}, f = 1\text{ MHz}$
				65		pF $V_F = 1\text{ V}, f = 1\text{ MHz}$
	Reverse leakage current	$I_R$		0.35	10	$\mu\text{A}$ $V_R = 3.0\text{ V}$
OUTPUT TRANSISTOR	Breakdown voltage					
	Collector to emitter	$BV_{CEO}$	30	45		$V$ $I_C = 10\text{ mA}, I_F = 0$
	Collector to base	$BV_{CBO}$	70	130		$V$ $I_C = 100\ \mu\text{A}, I_F = 0$
	Emitter to collector	$BV_{ECO}$	7	10		$V$ $I_E = 100\ \mu\text{A}, I_F = 0$
	Leakage current					
	Collector to emitter	$I_{CEO}$		5	50	$\text{nA}$ $V_{CE} = 10\text{ V}, I_F = 0$
	Collector to base	$I_{CBO}$			20	$\text{nA}$ $V_{CB} = 10\text{ V}, I_F = 0$
	Capacitance					
	Collector to emitter			8		pF $V_{CE} = 0, f = 1\text{ MHz}$
	Collector to base			20		pF $V_{CB} = 5, f = 1\text{ MHz}$
	Emitter to base			10		pF $V_{EB} = 0, f = 1\text{ MHz}$

ELECTRICAL CHARACTERISTIC CURVES ( $T_A = 25^\circ\text{C}$  Unless Otherwise Specified)

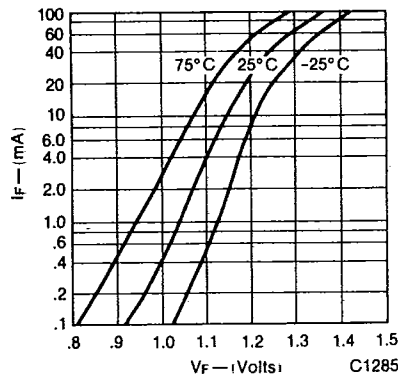


Fig. 1. Forward Voltage vs. Forward Current

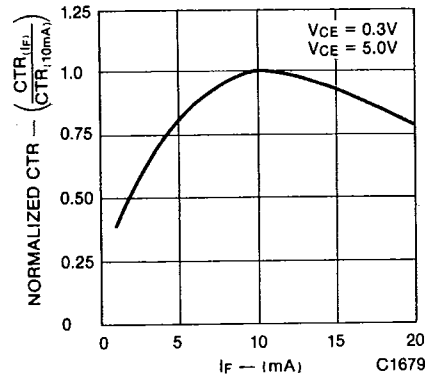


Fig. 2. Normalized Current Transfer Ratio vs. Forward Current

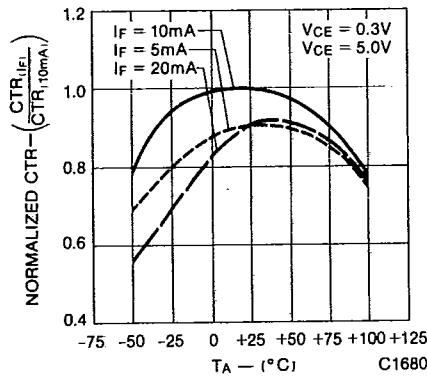


Fig. 3. Normalized Current Transfer Ratio vs. Ambient Temperature

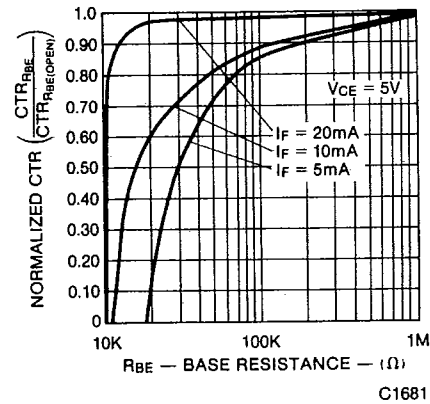


Fig. 4.  $C_{TR}$  vs.  $R_{BE}$

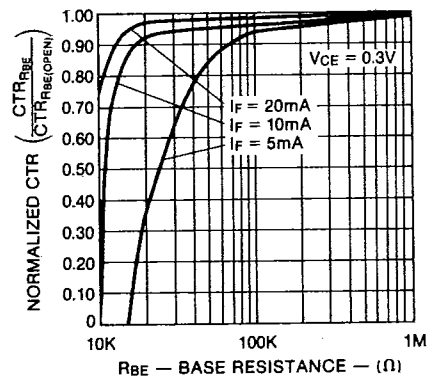


Fig. 5.  $C_{TR}$  vs.  $R_{BE}$

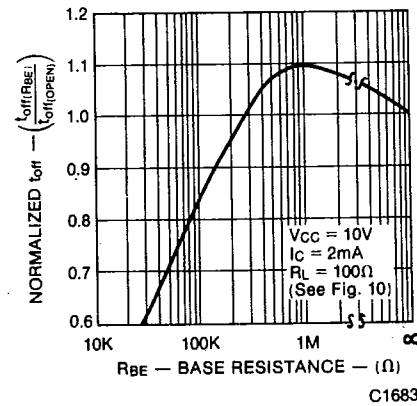
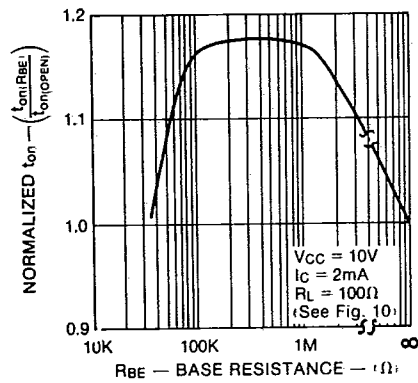
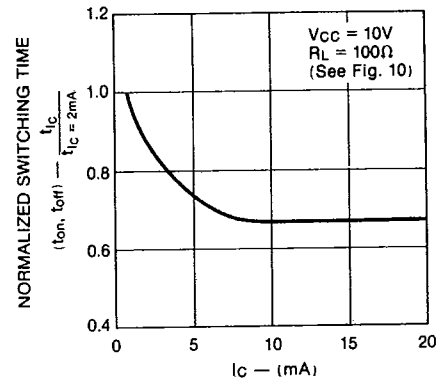


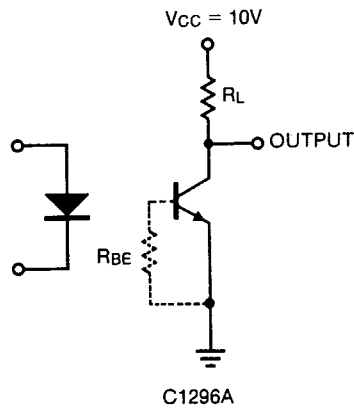
Fig. 6. Normalized  $t_{off}$  vs.  $R_{BE}$

**H11A1 H11A1Z****ELECTRICAL CHARACTERISTIC CURVES** ( $T_A = 25^\circ\text{C}$  Unless Otherwise Specified)

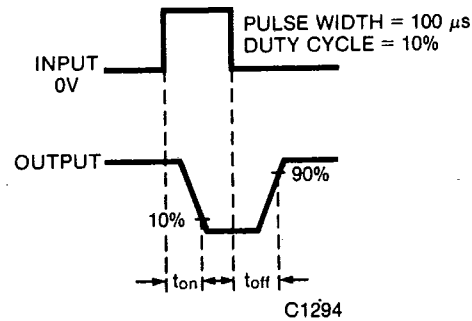
C1684



C1685



C1296A



C1294