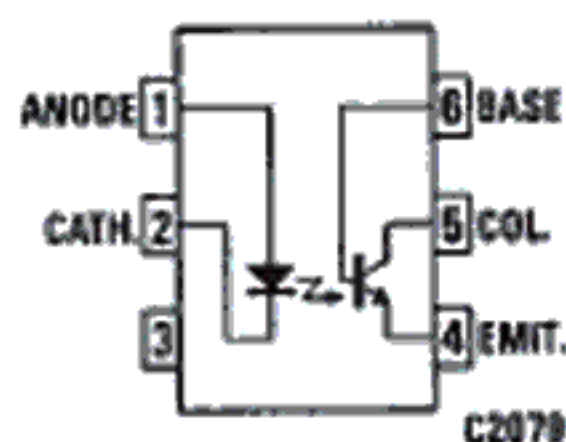
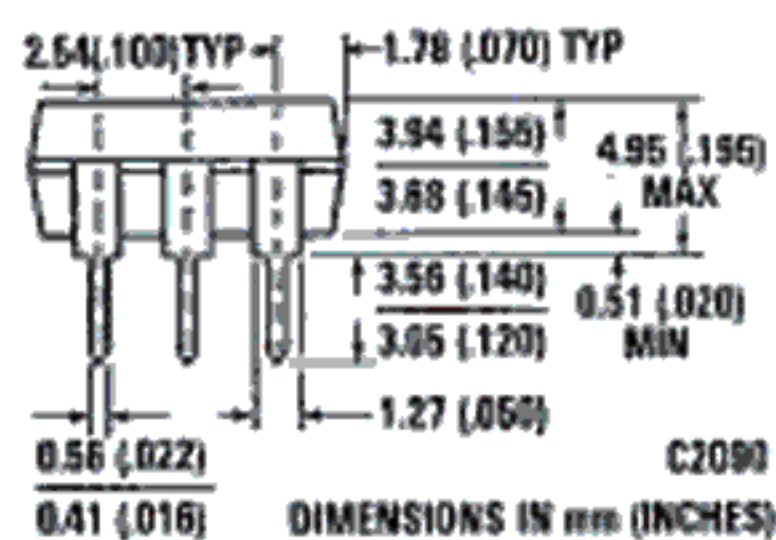
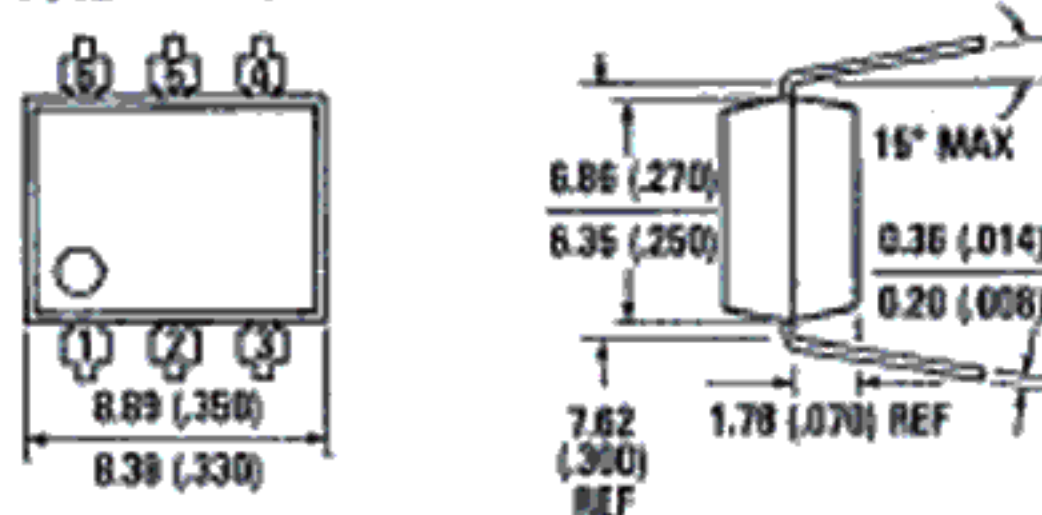


**GENERAL
INSTRUMENT****VDE APPROVED
TRANSISTOR OUTPUT OPTOCOUPLER**

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	$3.5\text{ mW}/^\circ\text{C}$

INPUT DIODE

Forward DC current	60 mA
Reverse voltage	6 V
Peak forward current (1 μs pulse, 300 pps)	3.0 A
Power dissipation 25°C ambient	100 mW
Derate linearly from 25°C	$1.0\text{ mW}/^\circ\text{C}$

OUTPUT TRANSISTOR

Power dissipation at 25°C	150 mW
Derate linearly from 25°C	$2.67\text{ mW}/^\circ\text{C}$
V_{CE0}	30 V
V_{CB0}	70 V
V_{EC0}	7 V
Collector current (continuous)	100 mA

H11A1 H11A1Z

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DT-41-83

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		μs ($V_{CE} = V, I_{CE} = 2\text{ mA}, R_L = 100\ \Omega$) See Figure 9
	Turn-off time	t_{off}		2		μs
	Non-saturated Turn-on time	t_{on}		300		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		ns
ISOLATION	Isolation voltage	V_{iso}	5300			VAC RMS Relative humidity $\leq 50\%$, $I_{-O} \leq 10\ \mu\text{A}$, 5 seconds
			7500			VAC PEAK Relative humidity $\leq 50\%$, $I_{-O} \leq 10\ \mu\text{A}$, 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		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	μA $V_R = 3.0\text{ V}$
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	nA $V_{CE} = 10\text{ V}, I_F = 0$
	Collector to base	I_{CBO}			20	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)

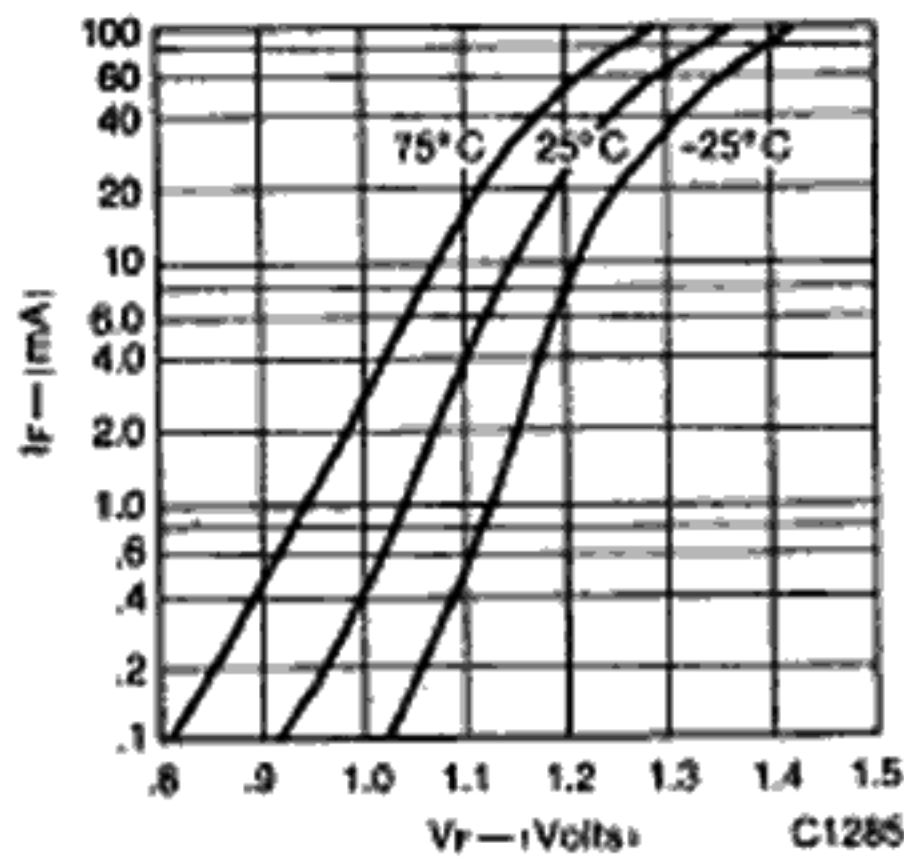


Fig. 1. Forward Voltage vs. Forward Current

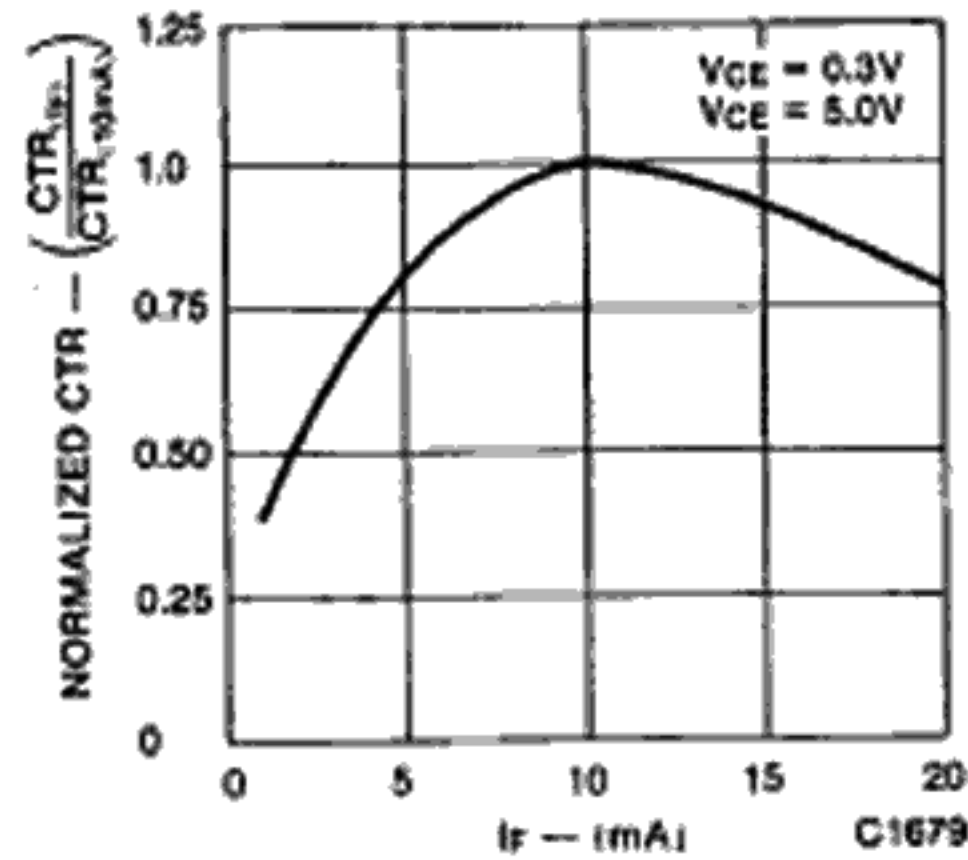


Fig. 2. Normalized Current Transfer Ratio vs. Forward Current

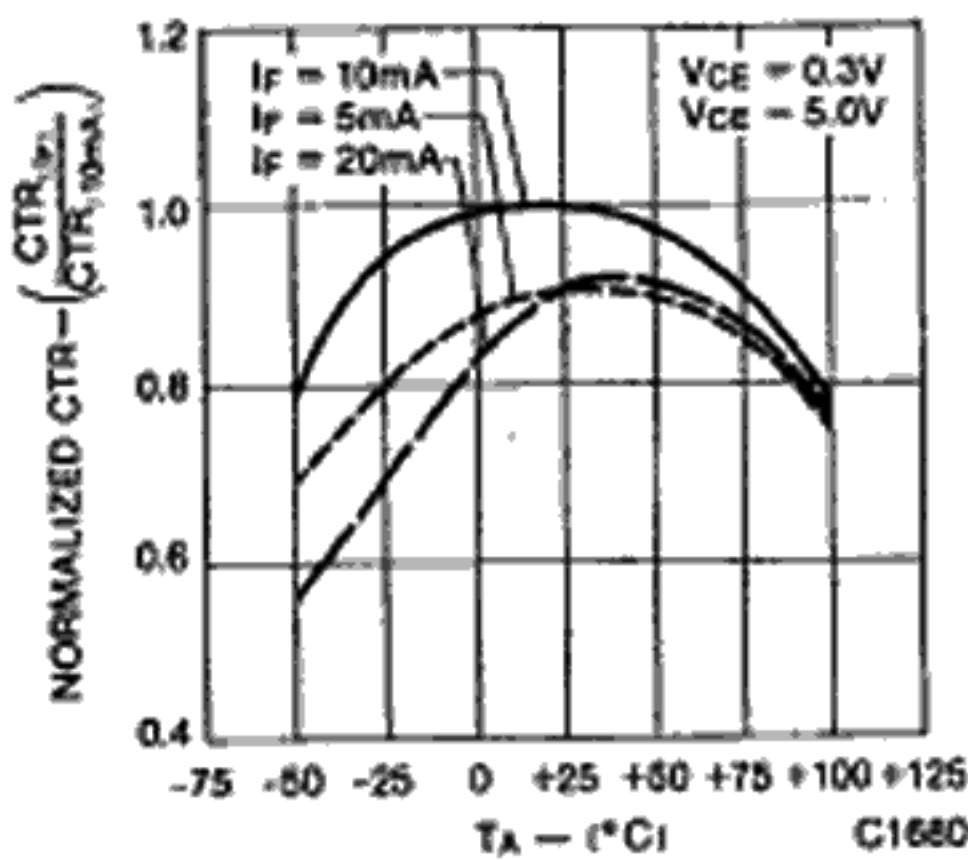


Fig. 3. Normalized Current Transfer Ratio vs. Ambient Temperature

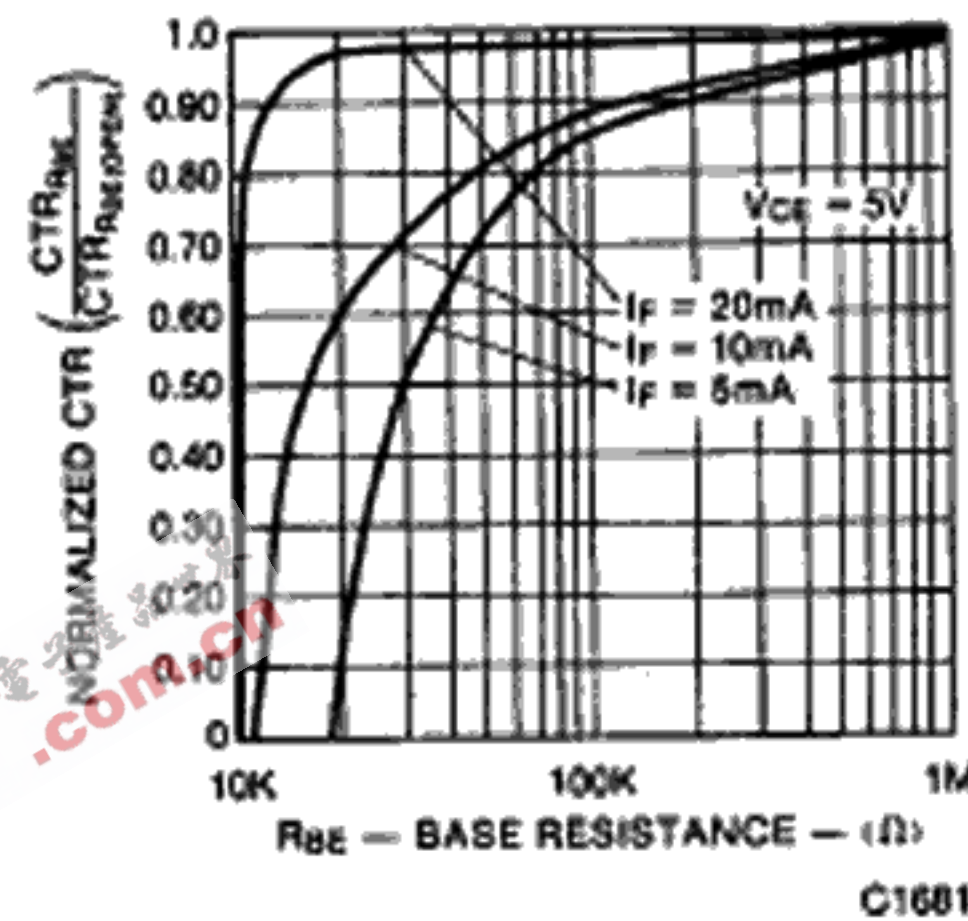


Fig. 4. C_{TR} vs. R_{BE}

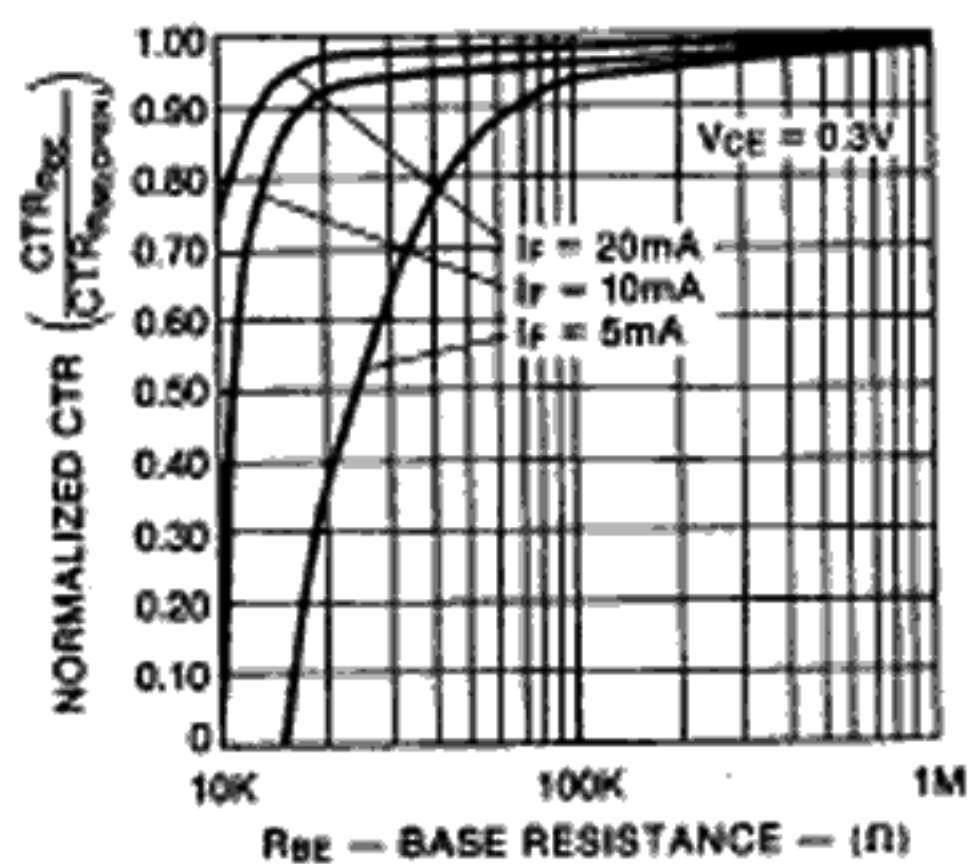


Fig. 5. C_{TR} vs. R_{BE}

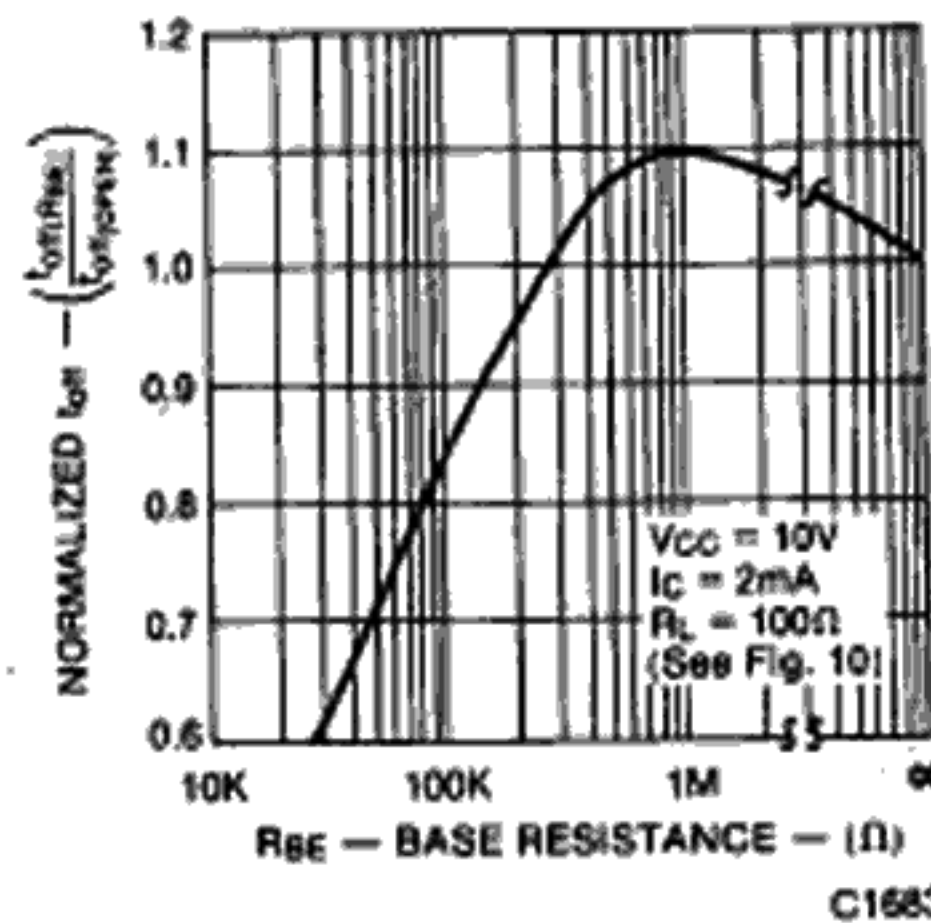


Fig. 6. Normalized I_{off} vs. R_{BE}

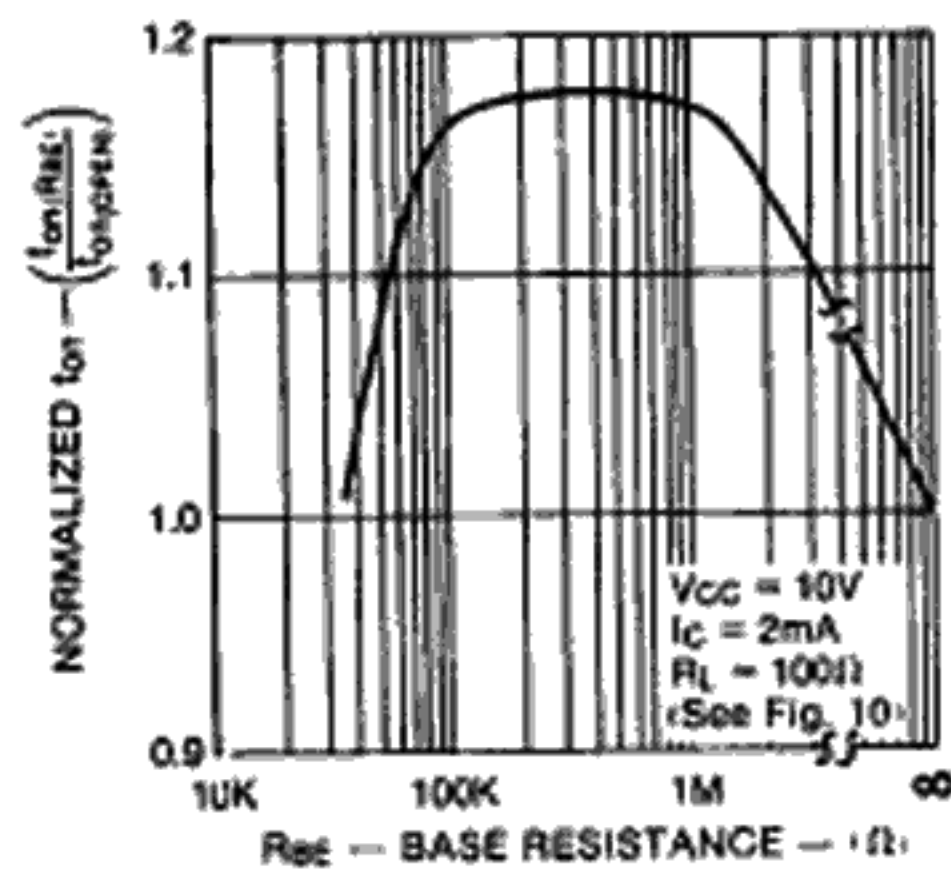
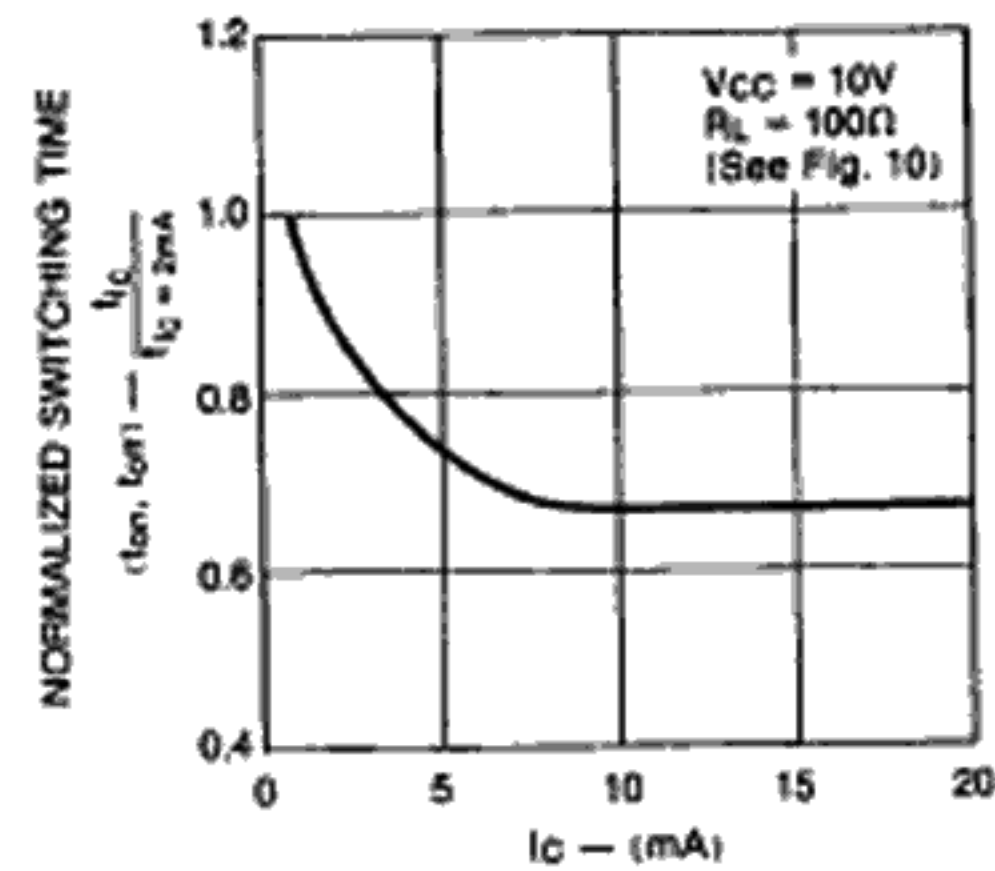
H11A1 H11A1Z**ELECTRICAL CHARACTERISTIC CURVES** ($T_A = 25^\circ\text{C}$ Unless Otherwise Specified)Fig. 7. Normalized I_{on} vs. R_B 

Fig. 8. Normalized Switching Time vs. Collector Current

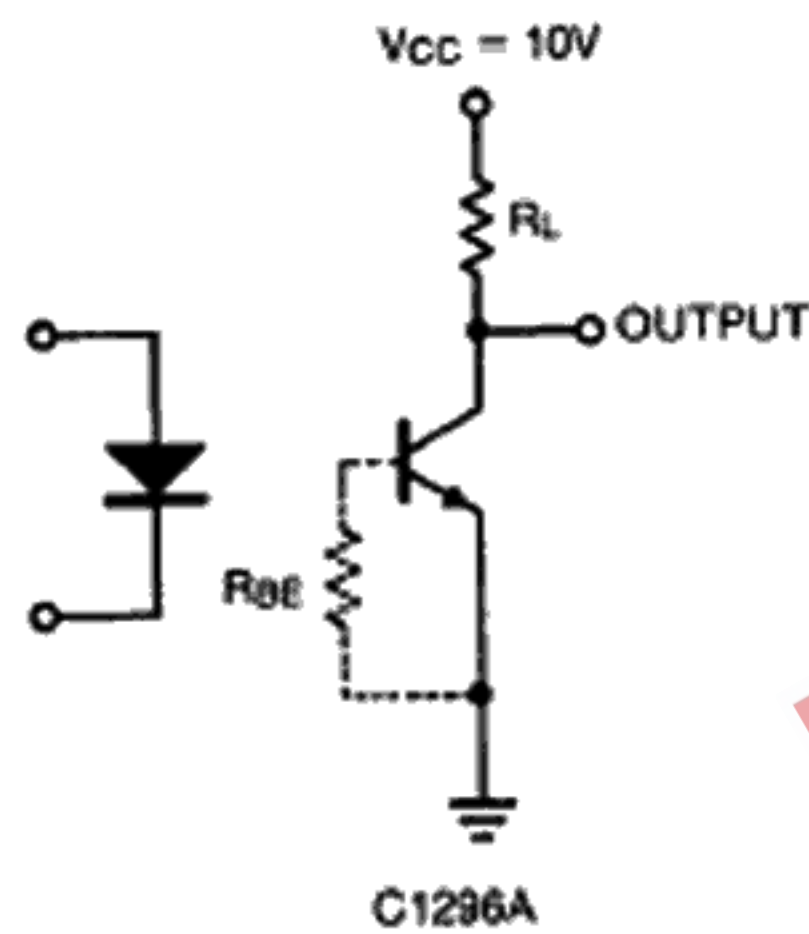


Fig. 9. Switching Time Test Circuit and Waveform