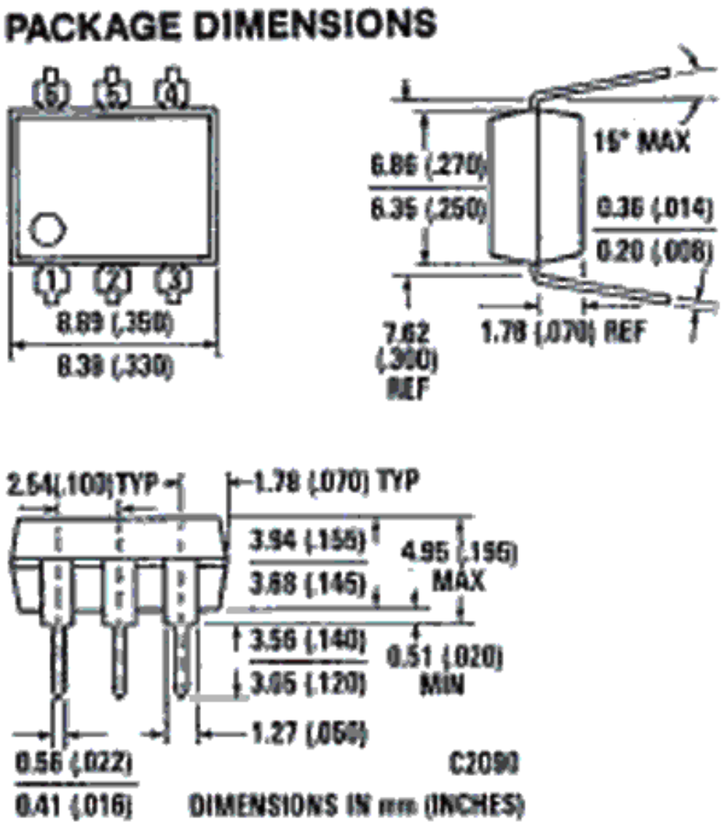
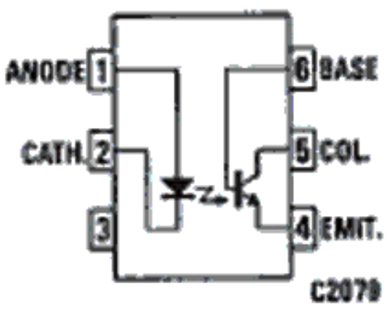
GENERAL INSTRUMENT

VDE APPROVED TRANSISTOR OUTPUT OPTOCOUPLER

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°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 µs 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_{CEO} ..... 30 V
V_{CBO} ..... 70 V
V_{ECO} ..... 7 V
Collector current (continuous) ..... 100 mA

ELECTRO-OPTICAL CHARACTERISTICS (T_A = 25°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 mA, V_{CE} = 10 V
	Saturation voltage	$V_{CE(SAT)}$		0.1	0.4	V	I_F = 10 mA, I_C = 0.5 mA
SWITCHING TIMES	Non-saturated Turn-on time	t_{on}		2		µs	(V_{CE} = V, I_{CE} 2 mA,
	Turn-off time	t_{off}		2		µs	R_L = 100 Ω) See Figure 9
	Non-saturated Turn-on time	t_{on}		300		ns	(V_{CB} = 10 V, I_{CB} 50 µA,
	Turn-off time	t_{off}		300		ns	R_L = 100 Ω) See Figure 9
ISOLATION	Isolation voltage	V_{ISO}	5300			V_{AC} RMS	Relative humidity ≤ 50%, I_{I-O} ≤ 10 µA, 5 seconds
			7500			V_{AC} PEAK	Relative humidity ≤ 50% I_{I-O} ≤ 10 µA, 5 seconds
	Isolation resistance	R_{ISO}	10^{11}			ohms	V_{I-O} = 500 VDC
	Isolation capacitance	C_{ISO}		0.5		pF	f = 1 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 mA
	Forward voltage temperature coefficient			-1.8		mV/°C	
	Reverse voltage	V_R	3.0	25		V	I_R = 10 µA
	Junction capacitance	C_J		50		pF	V_F = 0 V, f = 1 MHz
				65		pF	V_F = 1 V, f = 1 MHz
	Reverse leakage current	I_R		0.35	10	µA	V_R = 3.0 V
OUTPUT TRANSISTOR	Breakdown voltage						
	Collector to emitter	BV_{CEO}	30	45		V	I_C = 10 mA, I_F = 0
	Collector to base	BV_{CBO}	70	130		V	I_C = 100 µA, I_F = 0
	Emitter to collector	BV_{ECO}	7	10		V	I_E = 100 µA, I_F = 0
	Leakage current						
	Collector to emitter	I_{CEO}		5	50	nA	V_{CE} = 10 V, I_F = 0
	Collector to base	I_{CBO}			20	nA	V_{CB} = 10 V, I_F = 0
	Capacitance						
	Collector to emitter			8		pF	V_{CE} = 0, f = 1 MHz
	Collector to base			20		pF	V_{CB} = 5, f = 1 MHz
	Emitter to base			10		pF	V_{EB} = 0, f = 1 MHz

ELECTRICAL CHARACTERISTIC CURVES (T_A = 25°C Unless Otherwise Specified)

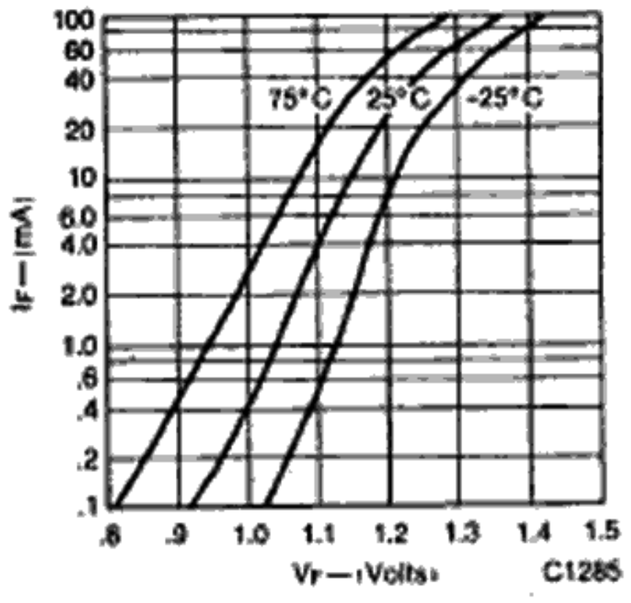


Fig. 1. Forward Voltage vs. Forward Current

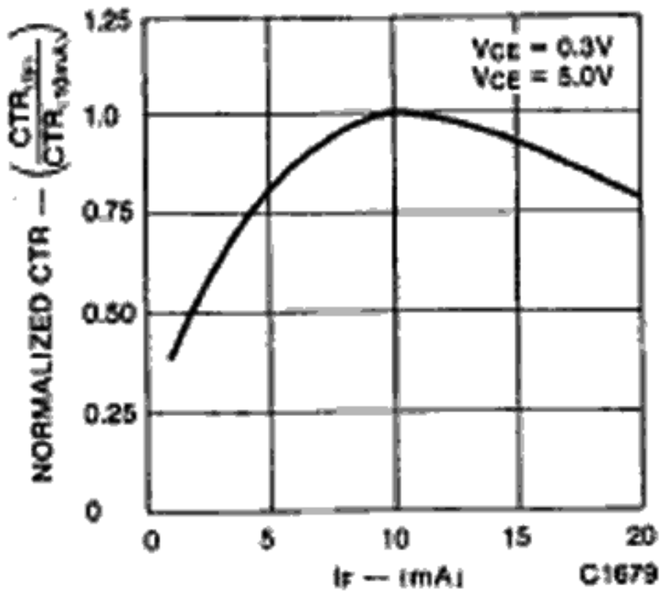


Fig. 2. Normalized Current Transfer Ratio vs. Forward Current

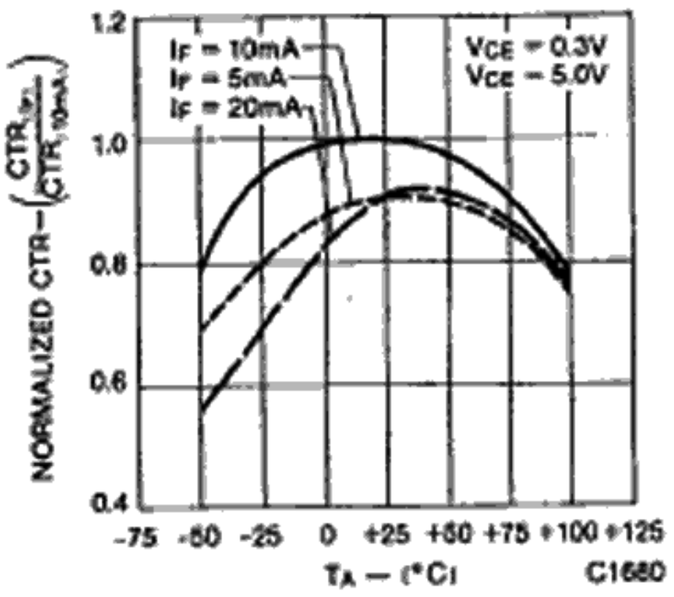


Fig. 3. Normalized Current Transfer Ratio vs. Ambient Temperature

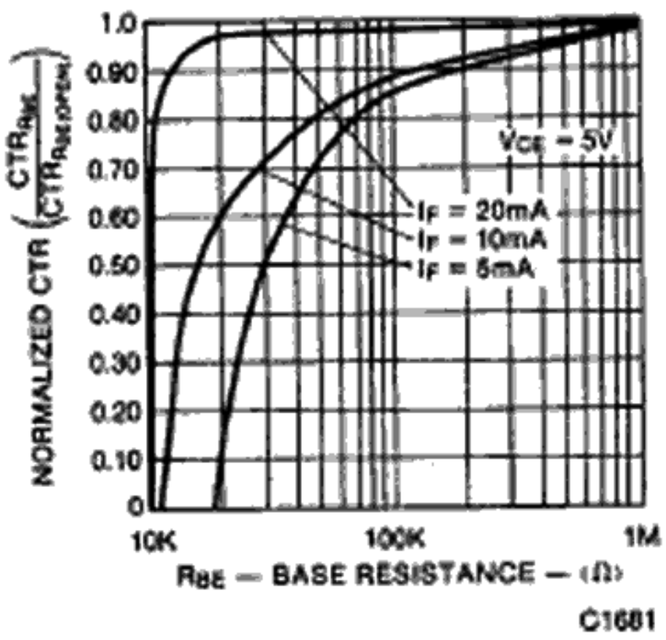


Fig. 4. C_{TR} vs. R_{BE}

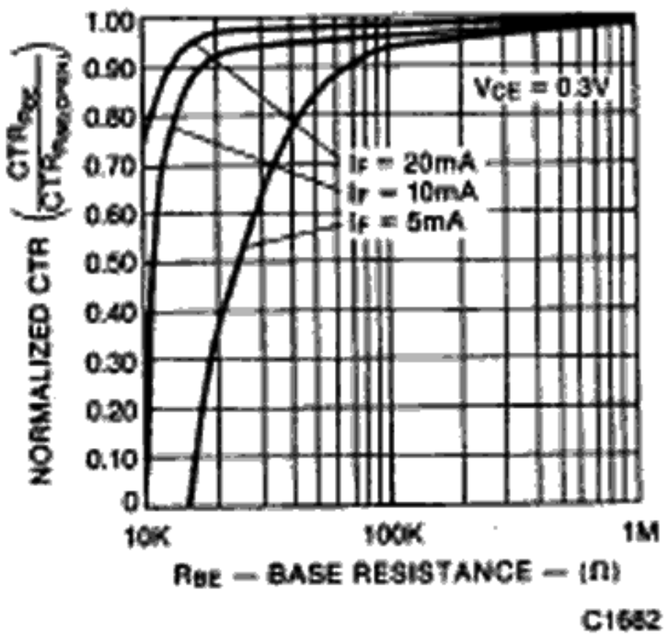


Fig. 5. C_{TR} vs. R_{BE}

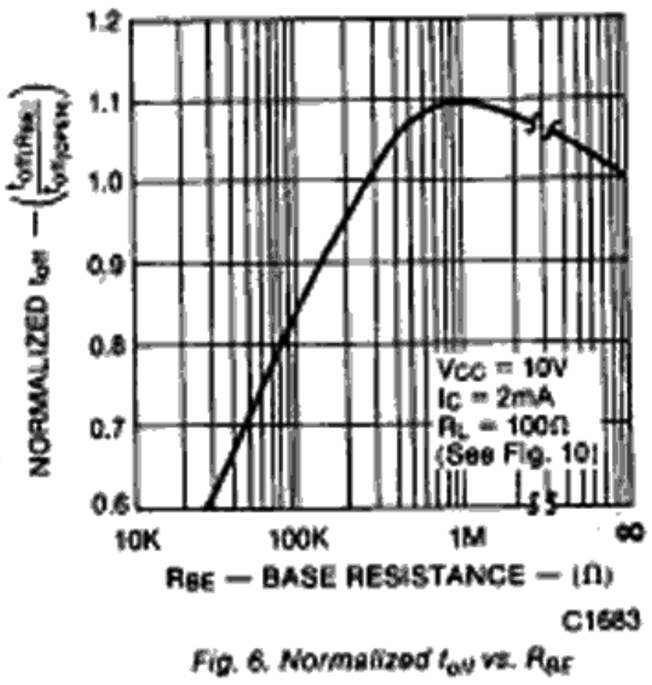


Fig. 6. Normalized t_{on} vs. R_{BE}

ELECTRICAL CHARACTERISTIC CURVES (T_A = 25°C Unless Otherwise Specified)

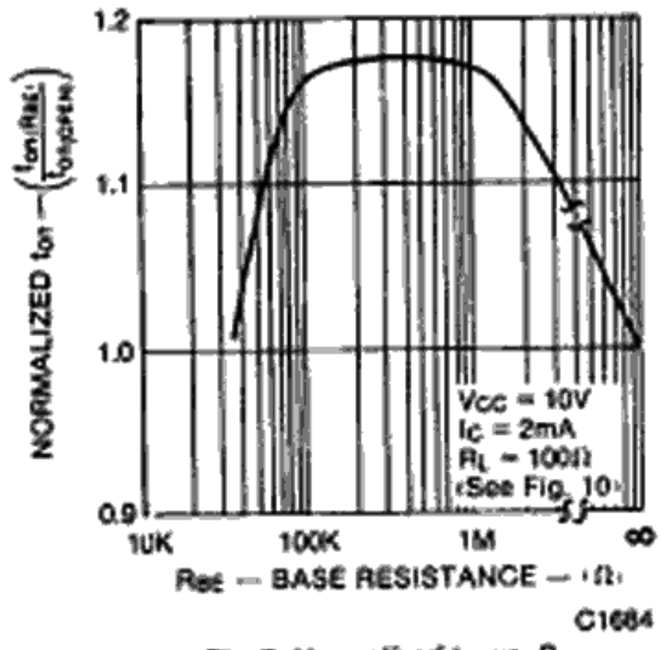


Fig. 7. Normalized t_{on} vs. R_{BE}

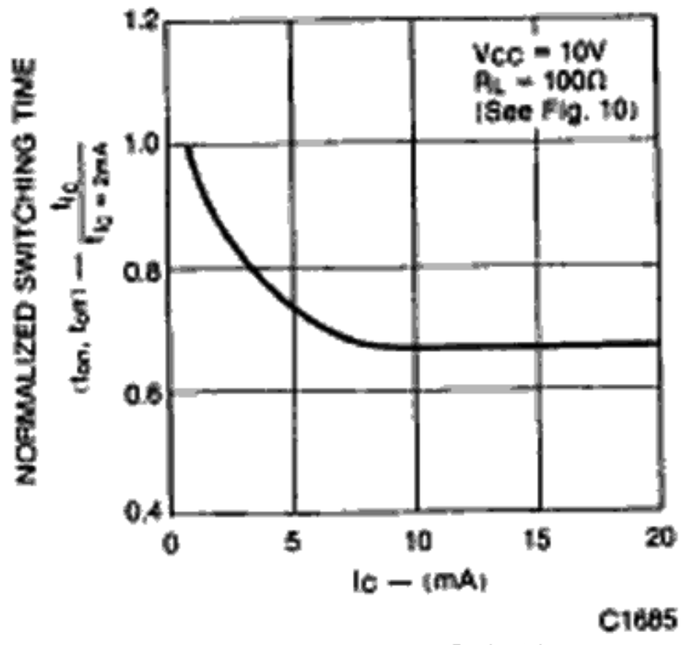
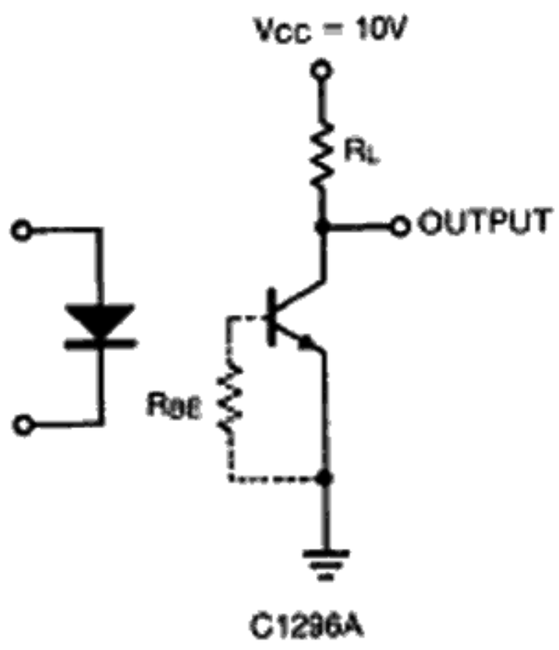


Fig. 8. Normalized Switching Time vs. Collector Current



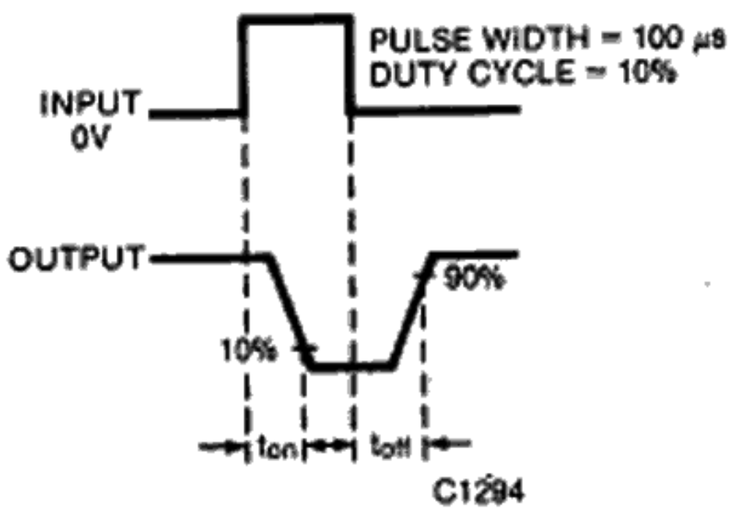


Fig. 9. Switching Time Test Circuit and Waveform