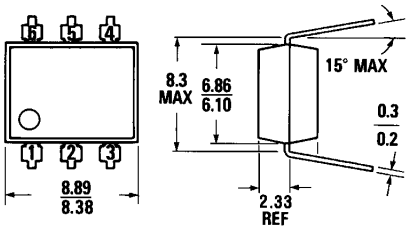
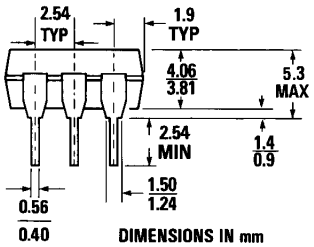
FAIRCHILD
SEMICONDUCTOR™

TRANSISTOR OUTPUT OPTOCOUPLER

H11A1

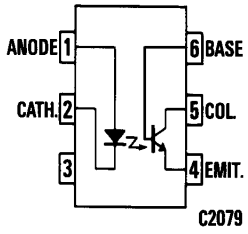
PACKAGE DIMENSIONS





DIMENSIONS IN mm
PACKAGE CODE K

ST1603A



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—1 minute
  7500 VAC PEAK—1 minute
- Minimum current transfer ratio of 50%
- Underwriters Laboratory (UL) recognized File #E90700

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 @ 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 @ 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

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ELECTRO-OPTICAL CHARACTERISTICS (25°C Temperature Unless Otherwise Specified)

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	$\frac{\Delta V_F}{\Delta T_A}$		−1.8		mV/°C	
Reverse voltage	V_R	3.0	15		V	I_R=10 μA
Junction capacitance	C_J		50 65		pF pF	V_F=0 V, f=1 MHz 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=100μA, 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

TRANSFER CHARACTERISTICS

DC CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
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

TRANSFER CHARACTERISTICS

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
SWITCHING TIMES						
Non-saturated Turn-on time	t_{on}		2		μs	(V_{CE}=10V, I_{CE} 2 mA, R_L=100 Ω)
Turn-off time	t_{off}		2		μs	See Fig. 10 and 11
Non-saturated Turn-on time	t_{on}		300		ns	(V_{CE}=10 V, I_{CE} 50 μA, R_L=100 Ω)
Turn-off time	t_{off}		300		ns	See Fig. 10 and 11

ISOLATION CHARACTERISTICS

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
Isolation voltage	V_{ISO}	5300			V_{AC} RMS	I_{I-O}≤1 μA, 1 minute
		7500			V_{AC} PEAK	I_{I-O}≤1 μA, 1 minute
Isolation resistance	R_{ISO}	10^{11}			ohms	V_{I-O}=500 VDC
Isolation capacitance	C_{ISO}		0.5		pF	f=1 MHz

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

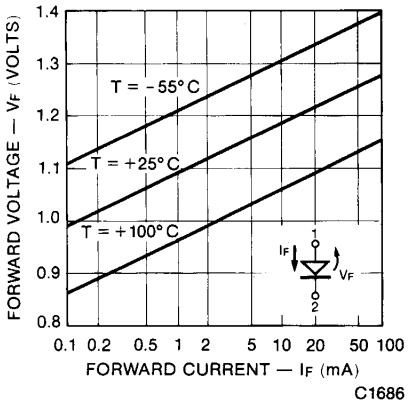

Fig. 1. Forward Voltage vs. Current

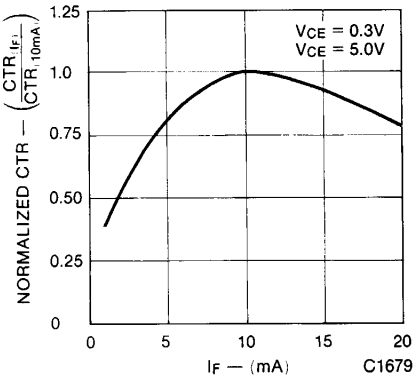

Fig. 2. Normalized CTR vs. Forward Current

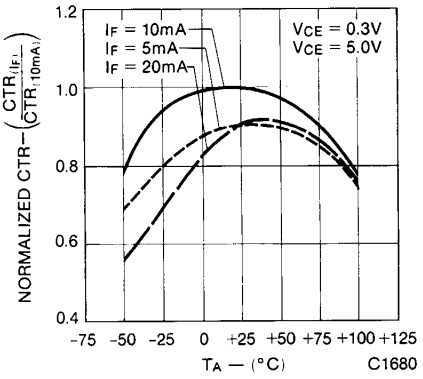

Fig. 3. Normalized CTR vs. Temperature

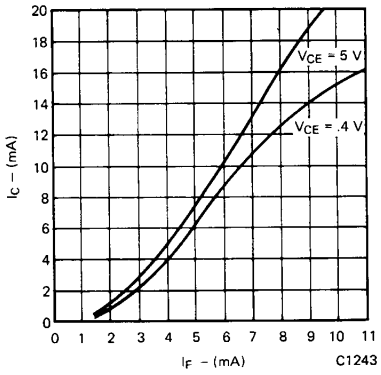

Fig. 4. Collector Current vs. Forward Current

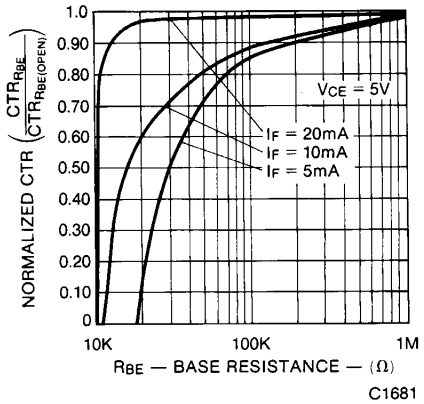

Fig. 5. CTR vs. RBE (Unsaturated)

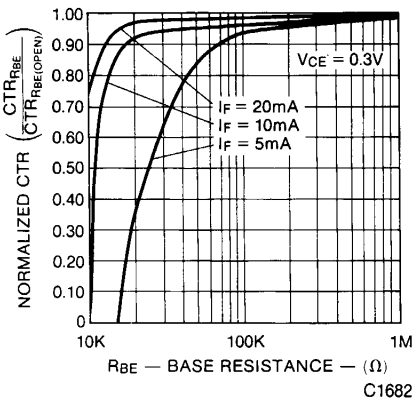

Fig. 6. CTR vs. RBE (Saturated)

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

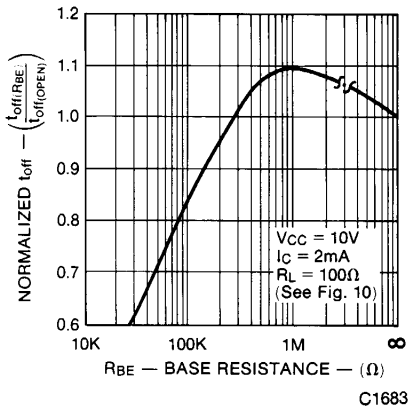

Fig. 7. Normalized T_{OFF} vs. RBE

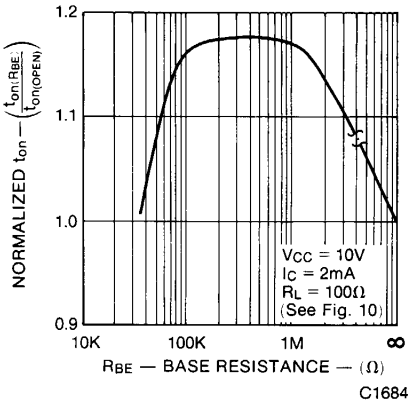

Fig. 8. Normalized T_{ON} vs. RBE

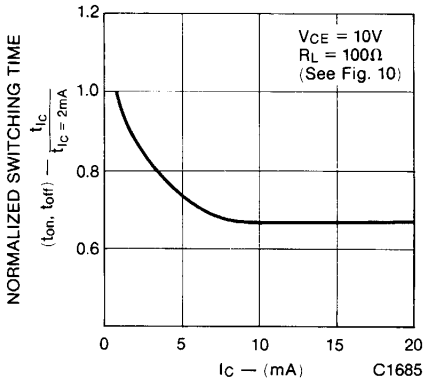

Fig. 9. Switching Time vs. IC

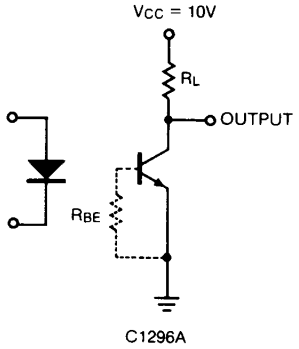

Fig. 10. Switching Time Test Circuit

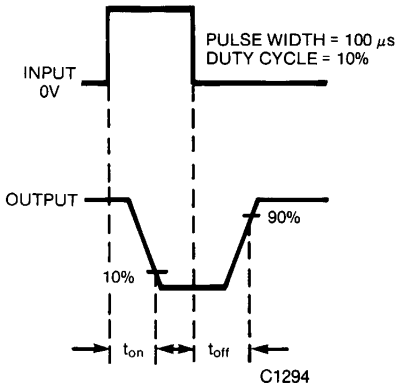

Fig. 11. Switching Time Waveforms

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.