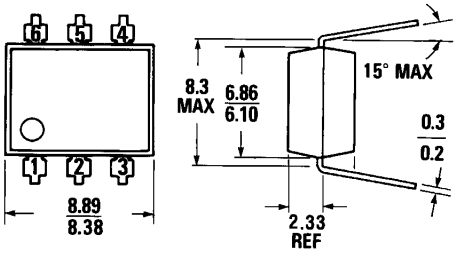
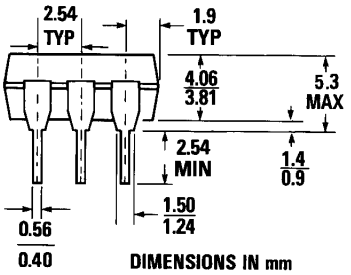
FAIRCHILD
SEMICONDUCTOR™

PHOTOTRANSISTOR OPTOCOUPLERS

CNY17-1 CNY17-3
CNY17-2 CNY17-4

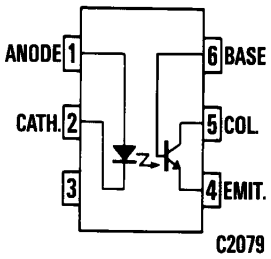
PACKAGE DIMENSIONS





DIMENSIONS IN mm
PACKAGE CODE K

ST1603A



Equivalent Circuit

DESCRIPTION

The CNY17 series consists of a Gallium Arsenide IRED coupled with an NPN phototransistor.

FEATURES

- High isolation voltage
  5300 VAC RMS—1 minute
  7500 VAC PEAK—1 minute
- High BV_{CEO} minimum 70 volts
- Current transfer ratio in selected groups:
  CNY17-1: 40%- 80%
  CNY17-2: 63%-125%
  CNY17-3: 100%-200%
  CNY17-4: 160%-320%
- Maximum switching time in saturation specified
- Underwriters Laboratory (UL) recognized File #E90700

APPLICATIONS

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

ABSOLUTE MAXIMUM RATINGS

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 ..... 90 mA
Reverse voltage ..... 6 V
Peak forward current
(1 μs pulse, 300 pps) ..... 3.0 A
Power dissipation 25°C ambient ..... 135 mW
Derate linearly from 25°C ..... 1.8 mW/°C

OUTPUT TRANSISTOR

Power dissipation @ 25°C ..... 200 mW
Derate linearly from 25°C ..... 2.67 mW/°C

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		1.3	1.50	V	I_F=60 mA
Forward voltage temp. coefficient	$\frac{\Delta V_F}{\Delta T_A}$		−1.8		mV/°C	
Reverse voltage	V_R	6.0	15		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		.35	10	μA	V_R=3.0 V
OUTPUT TRANSISTOR						
DC forward current gain	h_{FE}	100	500			V_{CE}=5 V, I_C=100 μA
Breakdown voltage						
Collector to emitter	BV_{CEO}	70			V	I_C=1.0 mA, I_F=0
Collector to base	BV_{CBO}	70			V	I_C=10 μA, I_F=0
Emitter to collector	BV_{ECO}	7			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				%	I_F=10 mA; V_{CE}=5 V
CNY17-1		40		80		
CNY17-2		63		125		
CNY17-3		100		200		
CNY17-4		160		320		
Saturation voltage	$V_{CE(SAT)}$		0.27	.40	V	I_F=10 mA; I_C=2.5 mA

TRANSFER CHARACTERISTICS

AC CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
SWITCHING TIMES						
Non-saturated						R_L=100 Ω; I_C=2 mA;
Turn-on time	t_{on}		6.0	10	μs	V_{CC}=10 V
Turn-off time	t_{off}		5.5	10	μs	See Fig. 10 and Fig. 11.

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

TRANSFER CHARACTERISTICS (Cont'd)

AC CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
SATURATED SWITCHING TIMES						
Turn-on time	t_{on}					
CNY17-1			3.0	5.5	μs	I_F=20 mA, V_{CE}=0.4 V
CNY17-2, CNY17-3, CNY17-4			4.2	8.0	μs	I_F=10 mA, V_{CE}=0.4 V
Rise-time	t_r					
CNY17-1			2.0	4.0	μs	I_F=20 mA, V_{CE}=0.4 V
CNY17-2, CNY17-3, CNY17-4			3.0	6.0	μs	I_F=10 mA, V_{CE}=0.4 V
Turn-off time	t_{off}					
CNY17-1			18	34	μs	I_F=20 mA, V_{CE}=0.4 V
CNY17-2, CNY17-3, CNY17-4			23	39	μs	I_F=10 mA, V_{CE}=0.4 V
Fall-time	t_f					
CNY17-1			11	20	μs	I_F=20 mA, V_{CE}=0.4 V
CNY17-2, CNY17-3, CNY17-4			14	24	μs	I_F=10 mA, V_{CE}=0.4 V

ISOLATION CHARACTERISTICS

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
Isolation Voltage	V_{iso}	5300			V_{AC} RMS	$I_{I-O} \leq 1$ μA, 1 minute
	V_{iso}	7500			V_{AC} PEAK	$I_{I-O} \leq 1$ 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
(25°C Free Air Temperature Unless Otherwise Specified)

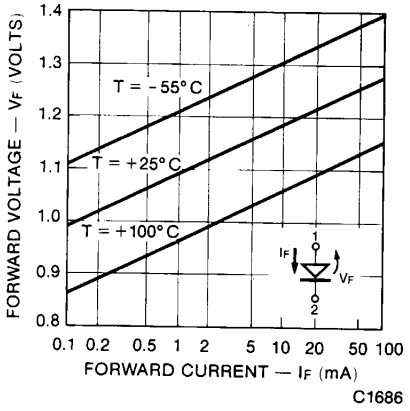


Fig. 1. Forward Voltage vs. Current

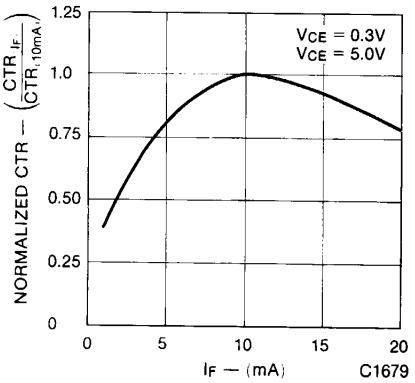


Fig. 2. Normalized CTR vs. Forward Current

ELECTRICAL CHARACTERISTIC CURVES

(25°C Free Air Temperature Unless Otherwise Specified) (Cont'd)

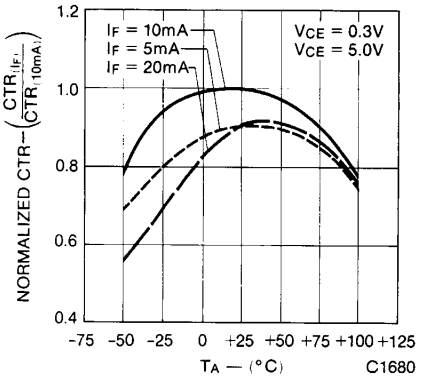


Fig. 3. Normalized CTR vs. Temperature

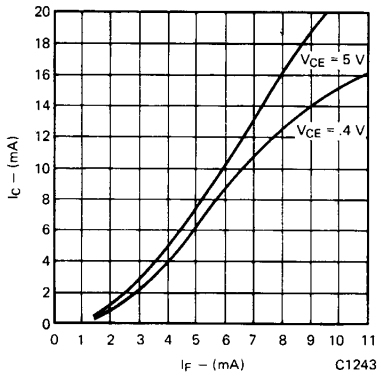


Fig. 4. Collector Current vs. Forward Current

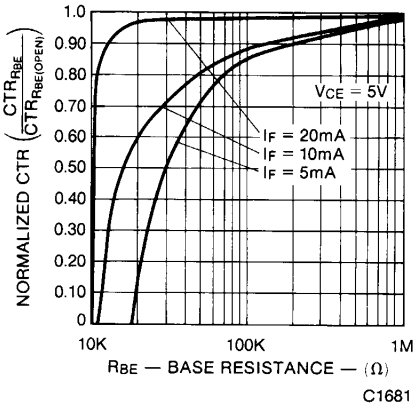


Fig. 5. CTR vs. RBE (Unsaturated)

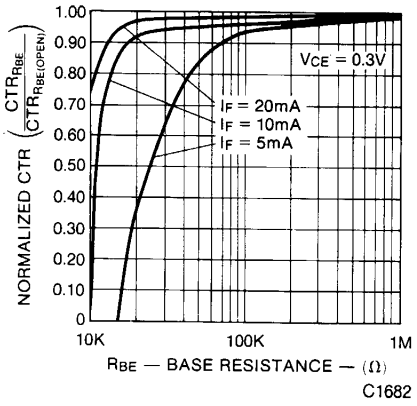


Fig. 6. CTR vs. RBE (Saturated)

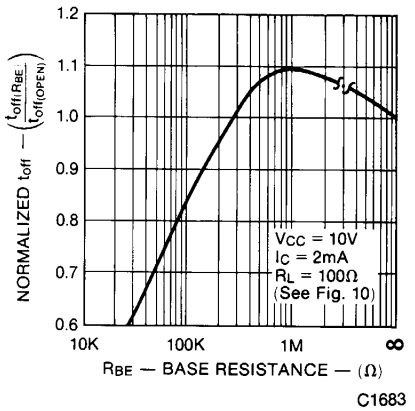


Fig. 7. Normalized T_{OFF} vs. RBE

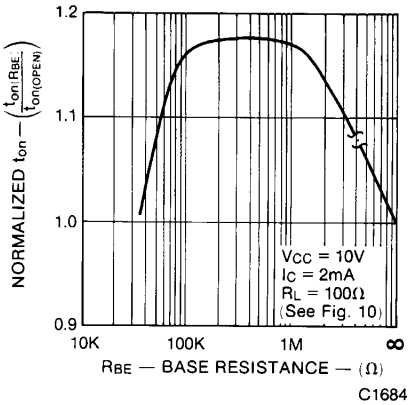


Fig. 8. Normalized T_{ON} vs. RBE

ELECTRICAL CHARACTERISTIC CURVES

(25°C Free Air Temperature Unless Otherwise Specified) (Cont'd)

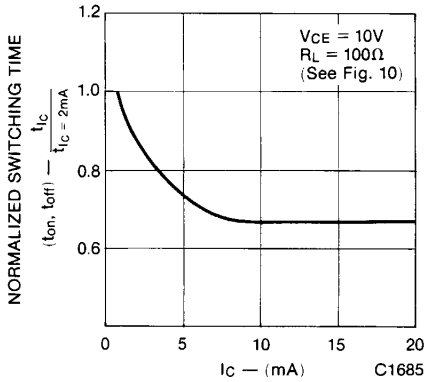


Fig. 9. Switching Time vs. IC

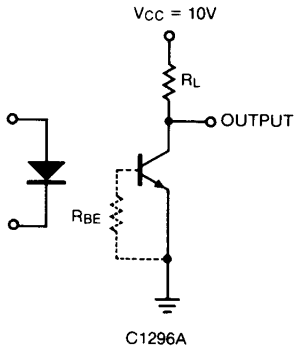


Fig. 10. Switching Time Test Circuit

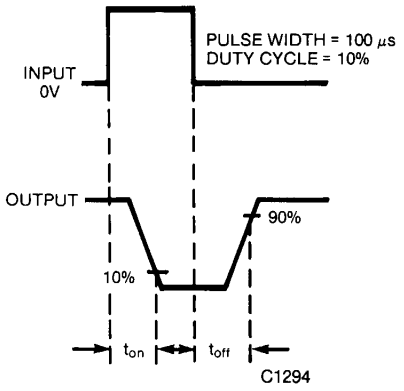


Fig. 11. Switching Time Waveforms

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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.