

**GENERAL
INSTRUMENT**

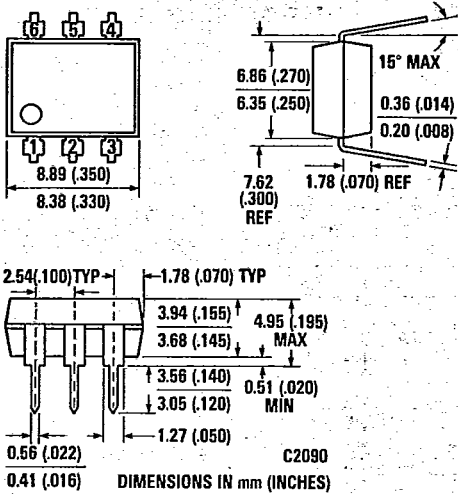
**VDE APPROVED
PHOTOTRANSISTOR OPTOCOUPLED**

Optocouplers



**CNY17-1/1Z CNY17-3/3Z
CNY17-2/2Z CNY17-4/4Z**

PACKAGE DIMENSIONS



DESCRIPTION

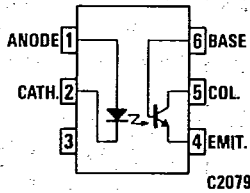
The CNY17 series consists of a Gallium Arsenide IRED coupled with an NPN phototransistor.

FEATURES

- High isolation voltage
5300 VAC RMS—5 seconds
7500 VAC PEAK—5 seconds
- 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 #E50151
- See VDE datasheet

APPLICATIONS

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



Equivalent Circuit

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	3 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

CNY17-1/1Z CNY17-2/2Z CNY17-3/3Z CNY17-4/4Z

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

TRANSFER CHARACTERISTICS							
	CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
DC	Current Transfer Ratio, collector to emitter	CTR				%	$I_F = 10 \text{ mA}; V_{CE} = 5 \text{ V}$
	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	$I_F = 10 \text{ mA}; I_C = 2.5 \text{ mA}$
SWITCHING TIMES	Non-saturated Turn-on time	t_{on}		6.0	10	μs	$R_L = 100 \Omega; I_C = 2 \text{ mA}; V_{CC} = 10 \text{ V}$ See figure 10.
	Turn-off time			5.5	10	μs	
ISOLATION	Isolation Voltage	V_{iso}	5300			$V_{AC \text{ RMS}}$	Relative humidity $\leq 50\%$, $I_{I-O} \leq 10 \mu\text{A}$, 5 seconds Relative humidity $\leq 50\%$, $I_{I-O} \leq 10 \mu\text{A}$, 5 seconds
		V_{iso}	7500			$V_{AC \text{ PEAK}}$	
	Isolation resistance	R_{iso}	10^{11}			ohms	$V_{I-O} = 500 \text{ VDC}$
	Isolation capacitance	C_{iso}		0.5		pF	$f = 1 \text{ MHz}$

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

INDIVIDUAL COMPONENT CHARACTERISTICS							
	CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
INPUT DIODE	Forward voltage	V_F		1.3	1.50	V	$I_F = 60 \text{ mA}$
	Forward voltage temp. 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	$V_F = 0 \text{ V}, f = 1 \text{ MHz}$
	Reverse leakage current	I_R		65		pF	$V_F = 1 \text{ V}, f = 1 \text{ MHz}$
OUTPUT TRANSISTOR	DC forward current gain	h_{FE}	100	500			$V_{CE} = 5 \text{ V}, I_C = 100 \mu\text{A}$
	Breakdown voltage						
	Collector to emitter	BV_{CEO}	70			V	$I_C = 1.0 \text{ mA}, I_F = 0$
	Collector to base	BV_{CBO}	70			V	$I_C = 10 \mu\text{A}$
	Emitter to collector	BV_{ECO}	7			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 (25°C Free Air Temperature Unless Otherwise Specified)

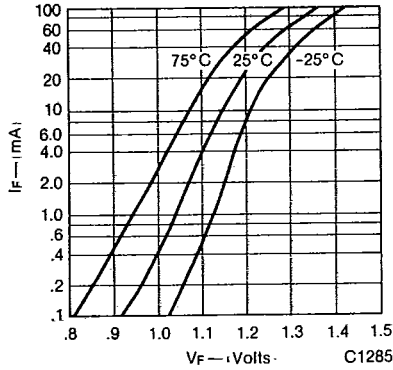


Fig. 1. Forward Voltage vs. Forward Current

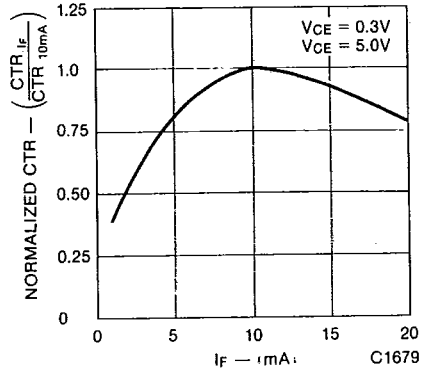


Fig. 2. Normalized Current Transfer Ratio vs. Forward Current

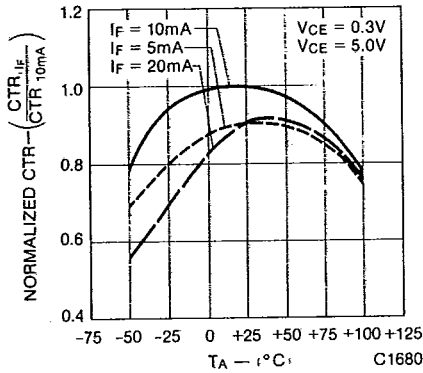


Fig. 3. Normalized Current Transfer Ratio vs. Ambient Temperature

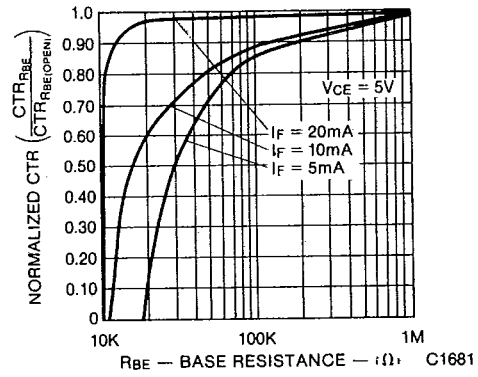


Fig. 4. CTR vs. RBE

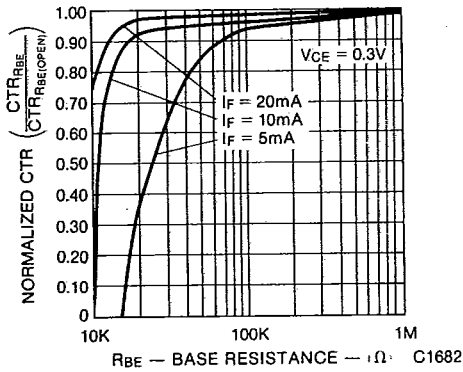


Fig. 5. CTR vs. RBE

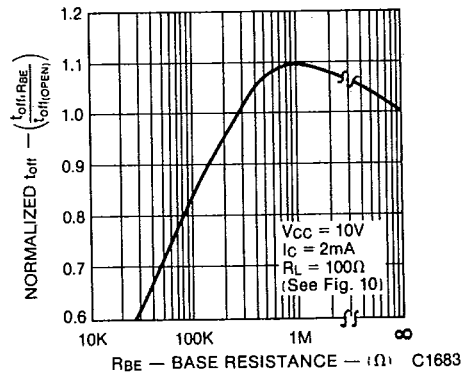


Fig. 6. Normalized t_{off} vs. RBE

ELECTRICAL CHARACTERISTIC CURVES (25°C Free Air Temperature Unless Otherwise Specified)

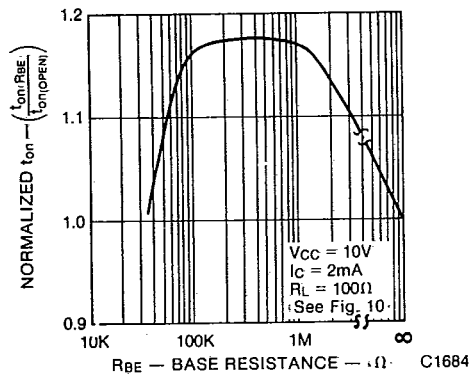


Fig. 7. Normalized t_{on} vs. R_{BE}

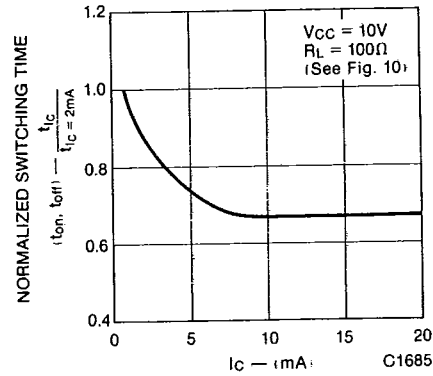


Fig. 8. Normalized Switching Time vs. Collector Current

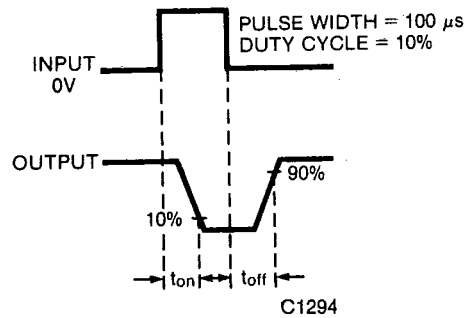
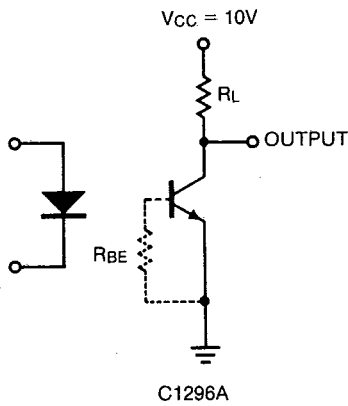


Fig. 9. Switching Time Test Circuit and Waveform