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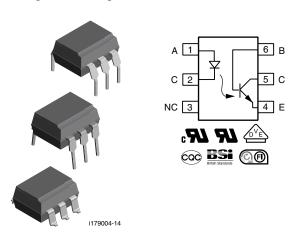




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Vishay Semiconductors

Optocoupler, Phototransistor Output, with Base Connection



DESCRIPTION

The CNY17 is an optically coupled pair consisting of a gallium arsenide infrared emitting diode optically coupled to a silicon NPN phototransitor.

Signal information, including a DC level, can be transmitted by the device while maintaining a high degree of electrical isolation between input and output.

The CNY17 can be used to replace relays and transformers in many digital interface applications, as well as analog applications such as CRT modulation.

FEATURES

- Isolation test voltage: 5000 V_{RMS}
- · Long term stability
- · Industry standard dual-in-line package
- Material categorization:
 For definitions of compliance please see www.vishay.com/doc?99912





RoHS COMPLIANT

AGENCY APPROVALS

Safety application model number covering all products in this datasheet is CNY17. This model number should be used when consulting safety agency documents.

- UL file no. E52744
- cUL tested to CSA 22.2 bulletin 5A
- DIN EN 60747-5-5 (VDE 0884-5)
- BSI IEC 60950, IEC 60065
- FIMKO EN60950
- CQC GB8898-2011

ORDERING INFORMATION							
C N Y 1 7 PART NUMBER	- # X	PACKAGE OPTION	# TAPE AND Option	10.16 mm Option 9			
	CTR (%)						
AGENCY CERTIFIED/PACKAGE		CTR	R (%)				
UL, cUL, BSI, FIMKO	40 to 80	63 to 125	100 to 200	160 to 320			
	40 to 80 CNY17-1			160 to 320 CNY17-4			
UL, cUL, BSI, FIMKO		63 to 125	100 to 200				
UL, cUL, BSI, FIMKO DIP-6	CNY17-1	63 to 125 CNY17-2	100 to 200 CNY17-3	CNY17-4			
UL, cUL, BSI, FIMKO DIP-6 DIP-6, 400 mil, option 6	CNY17-1 CNY17-1X006	63 to 125 CNY17-2 CNY17-2X006	100 to 200 CNY17-3 CNY17-3X006	CNY17-4 CNY17-4X006			
UL, cUL, BSI, FIMKO DIP-6 DIP-6, 400 mil, option 6 SMD-6, option 7	CNY17-1 CNY17-1X006 CNY17-1X007T ⁽¹⁾	63 to 125 CNY17-2 CNY17-2X006 CNY17-2X007T (1)	100 to 200 CNY17-3 CNY17-3X006 CNY17-3X007T (1)	CNY17-4 CNY17-4X006 CNY17-4X007T ⁽¹⁾			
UL, cUL, BSI, FIMKO DIP-6 DIP-6, 400 mil, option 6 SMD-6, option 7 SMD-6, option 9	CNY17-1 CNY17-1X006 CNY17-1X007T ⁽¹⁾ CNY17-1X009T ⁽¹⁾	63 to 125 CNY17-2 CNY17-2X006 CNY17-2X007T (1) CNY17-2X009T (1)	100 to 200 CNY17-3 CNY17-3X006 CNY17-3X007T (1) CNY17-3X009T (1)	CNY17-4 CNY17-4X006 CNY17-4X007T ⁽¹⁾ CNY17-4X009T ⁽¹⁾			

Note

SMD-6, option 7

SMD-6, option 9

CNY17-2X017T (1)

CNY17-2X019T (1)

CNY17-3X017T (1)

CNY17-4X017T (1)

CNY17-1X017

⁽¹⁾ Also available in tubes, do not put T on the end.

ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °C, unless otherwise specified)								
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT				
INPUT								
Reverse voltage		V_{R}	6	V				
Forward current		I _F	60	mA				
Forward surge current	t _p ≤ 10 μs	I _{FSM}	2.5	Α				
LED power dissipation	at 25 °C	P _{diss}	100	mW				
OUTPUT								
Collector emitter breakdown voltage		BV _{CEO}	70	V				
Emitter base breakdown voltage		BV _{EBO}	7	V				
Collector current		I _C	50	mA				
Collector current	$t_p/T = 0.5, t_p \le 10 \text{ ms}$	I _C	100	mA				
Power dissipation		P _{diss}	150	mW				
COUPLER								
Isolation test voltage between emitter and detector	t = 1 min	V _{ISO}	5000	V_{RMS}				
Storage temperature		T _{stg}	-55 to +150	°C				
Operating temperature		T _{amb}	-55 to +110	°C				
Soldering temperature (1)	2 mm from case, \leq 10 s	T _{sld}	260	°C				
Total power dissipation		P _{diss}	250	mW				

Notes

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.
- (1) Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

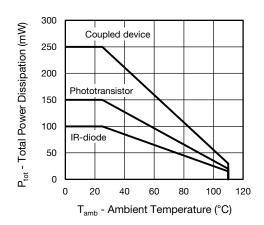


Fig. 1 - Total Power Dissipation vs. Ambient Temperature

ELECTRICAL CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT	INPUT						
Forward voltage	I _F = 60 mA		V_{F}		1.39	1.65	V
Breakdown voltage	I _R = 10 μA		V_{BR}	6			V
Reverse current	V _R = 6 V		I _R		0.01	10	μΑ
Capacitance	$V_R = 0 V, f = 1 MHz$		Co		25		pF
Thermal resistance			R _{th}		750		K/W



ELECTRICAL CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
OUTPUT							
Collector emitter capacitance	$V_{CE} = 5 \text{ V}, f = 1 \text{ MHz}$		C _{CE}		5.2		pF
Collector base capacitance	$V_{CE} = 5 \text{ V}, f = 1 \text{ MHz}$		C _{CB}		6.5		pF
Emitter base capacitance	$V_{CE} = 5 \text{ V}, f = 1 \text{ MHz}$		C _{EB}		7.5		pF
Thermal resistance			R _{th}		500		K/W
COUPLER							
Collector emitter, saturation voltage	$V_F = 10 \text{ mA}, I_C = 2.5 \text{ mA}$		V _{CEsat}		0.25	0.4	V
Coupling capacitance			C _C		0.6		pF
		CNY17-1	I _{CEO}		2	50	nA
Collector emitter, leakage current	V 40V	CNY17-2	I _{CEO}		2	50	nA
	V _{CE} = 10 V	CNY17-3	I _{CEO}		5	100	nA
		CNY17-4	I _{CEO}		5	100	nA

Note

• Minimum and maximum values were tested requierements. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information only and are not part of the testing requirements.

CURRENT TRANSFER RATIO (T _{amb} = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
		CNY17-1	CTR	40		80	%
	V - 5 V I - 10 mA	CNY17-2	CTR	63		125	%
	$V_{CE} = 5 \text{ V}, I_{F} = 10 \text{ mA}$	CNY17-3	CTR	100		200	%
1 /		CNY17-4	CTR	160		320	%
I _C /I _F		CNY17-1	CTR	13	30		%
	V 5V 1 4 mA	CNY17-2	CTR	22	45		%
	$V_{CE} = 5 \text{ V}, I_F = 1 \text{ mA}$	CNY17-3	CTR	34	70		%
		CNY17-4	CTR	56	90		%

SWITCHING CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
LINEAR OPERATION	(without saturation)						
Turn-on time	$I_F = 10 \text{ mA}, V_{CC} = 5 \text{ V}, R_L = 75 \Omega$		t _{on}		3		μs
Rise time	$I_F = 10 \text{ mA}, V_{CC} = 5 \text{ V}, R_L = 75 \Omega$		t _r		2		μs
Turn-off time	$I_F = 10 \text{ mA}, V_{CC} = 5 \text{ V}, R_L = 75 \Omega$		t _{off}		2.3		μs
Fall time	$I_F = 10 \text{ mA}, V_{CC} = 5 \text{ V}, R_L = 75 \Omega$		t _f		2		μs
Cut-off frequency	$I_F = 10 \text{ mA}, V_{CC} = 5 \text{ V}, R_L = 75 \Omega$		f _{CO}		110		kHz
SWITCHING OPERAT	ION (with saturation)						
	I _F = 20 mA	CNY17-1	t _{on}		3		μs
Turn-on time	I _F = 10 mA	CNY17-2	t _{on}		4.2		μs
rum-on time		CNY17-3	t _{on}		4.2		μs
	I _F = 5 mA	CNY17-4	t _{on}		6		μs
	I _F = 20 mA	CNY17-1	t _r		2		μs
Rise time	I _F = 10 mA	CNY17-2	t _r		3		μs
nise tillle	IF = TO ITIA	CNY17-3	t _r		3		μs
	I _F = 5 mA	CNY17-4	t _r		4.6		μs
	I _F = 20 mA	CNY17-1	t _{off}		18		μs
Turn-off time	1 10 mA	CNY17-2	t _{off}		23		μs
Turn-on time	I _F = 10 mA	CNY17-3	t _{off}		23		μs
	I _F = 5 mA	CNY17-4	t _{off}		25		μs
	I _F = 20 mA	CNY17-1	t _f		11		μs
Fall time	10 mA	CNY17-2	t _f		14		μs
Fall time	I _F = 10 mA	CNY17-3	t _f		14		μs
	I _F = 5 mA	CNY17-4	t _f		15		μs

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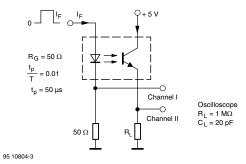


Fig. 2 - Test Circuit, Non-Saturated Operation

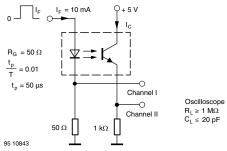


Fig. 3 - Test Circuit, Saturated Operation

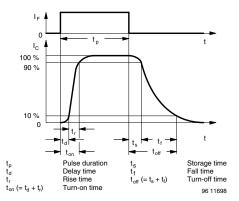


Fig. 4 - Switching Times

PARAMETER		SYMBOL	VALUE	UNIT
MAXIMUM SAFETY RATINGS				,
Output safety power		P _{SO}	700	mW
Input safety current		I _{SI}	400	mA
Safety temperature		T _{SI}	175	°C
Comparative tracking index		CTI	175	
INSULATION RATED PARAMETE	RS			
Maximum withstanding isolation vo	oltage	V _{ISO}	5000	V _{RMS}
Maximum transient isolation voltag	е	V _{IOTM}	8000	V _{peak}
Maximum repetitive peak isolation	voltage	V _{IORM}	890	V _{peak}
Insulation resistance	T _{amb} = 25 °C, V _{DC} = 500 V	R _{IO}	≥ 10 ¹²	Ω
Isolation resistance	$T_{amb} = 100 ^{\circ}\text{C}, V_{DC} = 500 \text{V}$	R _{IO}	≥ 10 ¹¹	Ω
Climatic classification (according to	IEC 68 part 1)		55/115/21	
Environment (pollution degree in ac	ccordance to DIN VDE 0109)		2	
Crannes distance	Standard DIP-4		≥7	mm
Creepage distance	SMD		≥7	mm
Classana distana	Standard DIP-4		≥8	mm
Clearance distance	SMD		≥8	mm
Insulation thickness		DTI	≥ 0.4	mm

Note

• As per DIN EN 60747-5-5, § 7.4.3.8.2, this optocoupler is suitable for "safe electrical insulation" only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.



TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

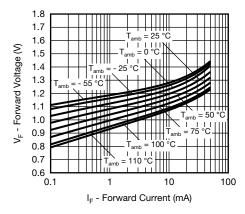


Fig. 5 - Forward Voltage vs. Forward Current

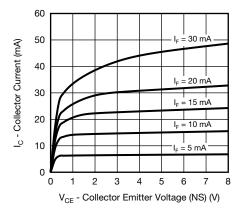


Fig. 6 - Collector Current vs. Collector Emitter Voltage (NS)

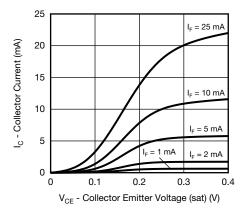


Fig. 7 - Collector Current vs. Collector Emitter Voltage (sat)

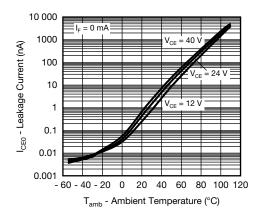


Fig. 8 - Leakage Current vs. Ambient Temperature

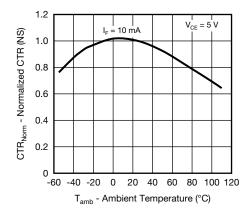


Fig. 9 - Normalized CTR (NS) vs. Ambient Temperature

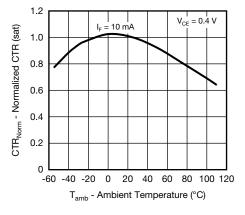


Fig. 10 - Normalized CTR (sat) vs. Ambient Temperature

For technical questions, contact: optocouplera

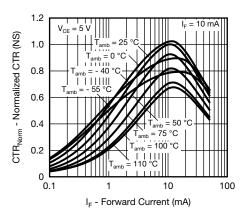


Fig. 11 - Normalized CTR (NS) vs. Forward Current

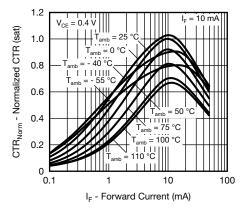


Fig. 12 - Normalized CTR (sat) vs. Forward Current

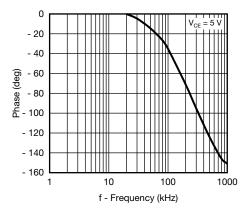


Fig. 13 - CTR Frequency vs. Phase Angle

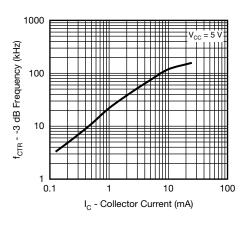


Fig. 14 - CTR -3 dB Frequency vs. Collector Current

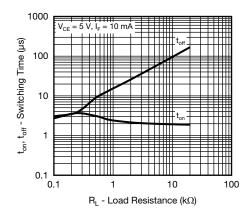
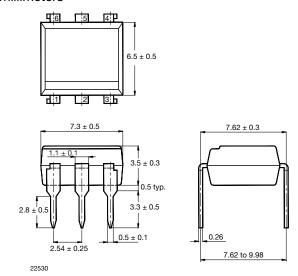
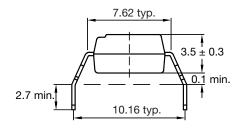


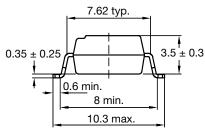
Fig. 15 - Switching Time vs. Load Resistance

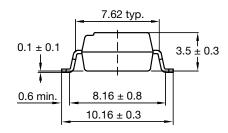
PACKAGE DIMENSIONS in millimeters

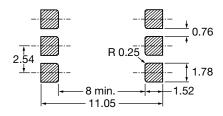


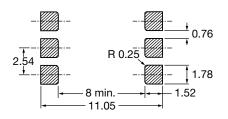
Option 6 Option 7 Option 9











20802-34

PACKAGE MARKING



Notes

- VDE logo is only marked on option 1 parts. Option information is not marked on the part.
- Tape and reel suffix (T) is not part of the package marking.

TUBE AND TAPE INFORMATION

DEVICES PER TUBE							
TYPE	UNITS/TUBE	TUBES/BOX	UNITS/BOX				
DIP-6	50	40	2000				

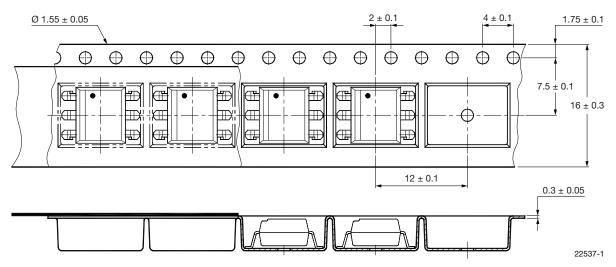


Fig. 16 - Tape and Reel Drawing, 1000 Units per Reel



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