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Vishay Semiconductors

Optocoupler, Phototransistor Output, no Base Connection



DESCRIPTION

The CNY17F is an optocoupler consisting of a gallium arsenide infrared emitting diode optically coupled to a silicon planar phototransistor detector in a plastic plug-in DIP-6 package.

The coupling device is suitable for signal transmission between two electrically separated circuits. The potential difference between the circuits to be coupled is not allowed to exceed the maximum permissible reference voltages.

In contrast to the CNY17 series, the base terminal of the F type is not conected, resulting in a substantially improved common-mode interference immunity.

FEATURES

- Isolation test voltage, 5000 V_{BMS}
- No base terminal connection for improved common mode interface immunity
- Long term stability
- Industry standard dual-in-line package
- COMPLIANT Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

AGENCY APPROVALS

Safety application model number covering all products in this datasheet is CNY17F. 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), available with option 1
- BSI: EN 60065, EN 60950-1
- FIMKO EN60950
- CQC GB8898-2011



Notes

Additional options may be possible, please contact sales office.

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

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ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °C, unless otherwise specified)								
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT				
INPUT								
Reverse voltage		V _R	6	V				
DC forward current		I _F	60	mA				
Surge forward current	t ≤ 10 µs	I _{FSM}	2.5	А				
Power dissipation		P _{diss}	100	mW				
OUTPUT								
Collector emitter breakdown voltage		BV _{CEO}	70	V				
Collector current		Ι _C	50	mA				
Collector peak current	$t_p/T = 0.5, t_p \le 10 \text{ ms}$	I _{CM}	100	mA				
Output power dissipation		P _{diss}	150	mW				
COUPLER								
Isolation test voltage between emitter and detector	t = 1 min	V _{ISO}	5000	V _{RMS}				
Storage temperature range		T _{stg}	-55 to +150	°C				
Ambient temperature range		T _{amb}	-55 to +110	°C				
Junction temperature		Тj	100	°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 parts (SMD). Refer to wave profile for soldering conditions for through hole parts (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							
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	μA
Capacitance	$V_R = 0 V$, f = 1 MHz		Co		25		pF
OUTPUT							
Collector emitter capacitance	V _{CE} = 5 V, f = 1 MHz		C _{CE}		5.2		pF
Base collector capacitance	V _{CE} = 5 V, f = 1 MHz		C _{BC}		6.5		pF
Emitter base capacitance	$V_{CE} = 5 V$, f = 1 MHz		C _{EB}		7.5		pF

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ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)								
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT	
COUPLER								
Collector emitter, saturation voltage	$I_{\rm F}$ = 10 mA, $I_{\rm C}$ = 2.5 mA		V _{CEsat}		0.25	0.4	V	
Coupling capacitance			CC		0.6		pF	
Collector emitter, leakage current	V _{CE} = 10 V	CNY17F-1	I _{CEO}		2	50	nA	
		CNY17F-2	I _{CEO}		2	50	nA	
		CNY17F-3	I _{CEO}		5	100	nA	
		CNY17F-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 ($T_{amb} = 25 \text{ °C}$, unless otherwise specified)								
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT	
I _C /I _F	I _F = 10 mA	CNY17F-1	CTR	40		80	%	
		CNY17F-2	CTR	63		125	%	
		CNY17F-3	CTR	100		200	%	
		CNY17F-4	CTR	160		320	%	
	I _F = 1 mA	CNY17F-1	CTR	13	30		%	
		CNY17F-2	CTR	22	45		%	
		CNY17F-3	CTR	34	70		%	
		CNY17F-4	CTR	56	90		%	

Note

• Current transfer ratio I_C/I_F at V_{CE} = 5 V, 25 °C and collector emitter leakage current by dash number.

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 mA, V _{CC} = 5 V, R _L = 75 Ω		t _{on}		3		μs	
Rise time	I _F = 10 mA, V _{CC} = 5 V, R _L = 75 Ω		t _r		2		μs	
Turn-off time	I _F = 10 mA, V _{CC} = 5 V, R _L = 75 Ω		t _{off}		2.3		μs	
Fall time	I_F = 10 mA, V _{CC} = 5 V, R _L = 75 Ω		t _f		2		μs	
Cut-off frequency	I_F = 10 mA, V _{CC} = 5 V, R _L = 75 Ω		f _{CO}		110		kHz	
SWITCHING OPERATION (with	saturation)							
	I _F = 20 mA	CNY17F-1	t _{on}		3		μs	
Turn-on time	I _F = 10 mA	CNY17F-2	t _{on}		4.2		μs	
		CNY17F-3	t _{on}		4.2		μs	
	I _F = 5 mA	CNY17F-4	t _{on}		6		μs	
	I _F = 20 mA	CNY17F-1	t _r		2		μs	
Rise time	I 10 mA	CNY17F-2	t _r		3		μs	
	1º - 10 11/2	CNY17F-3	t _r		3		μs	
	I _F = 5 mA	CNY17F-4	t _r		4.6		μs	
	I _F = 20 mA	CNY17F-1	t _{off}		18		μs	
Turn-off time	l= – 10 mΔ	CNY17F-2	t _{off}		23		μs	
	$I_F = 10 \text{ IIIA}$	CNY17F-3	t _{off}		23		μs	
	I _F = 5 mA	CNY17F-4	t _{off}		25		μs	
	I _F = 20 mA	CNY17F-1	t _f		11		μs	
Fall time	I _F = 10 mA -	CNY17F-2	t _f		14		μs	
Fail time		CNY17F-3	t _f		14		μs	
	I _F = 5 mA	CNY17F-4	t _f		15		μs	

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Fig. 2 - Test Circuit, Non-Saturated Operation



 I_F 0 t_p t $I_{\rm C}$ 100 % 90 % 10 % 0 t tf t. t_{on} t_p t_d t_r Pulse duration Storage time t_s Delay time Fall time tf Turn-off time Rise time $= t_s + t_f$ l_{off} $\dot{t}_{on} (= t_d + t_r)$ Turn-on time 96 11698

Fig. 4 - Switching Times

SAFETY AND INSULATION RATINGS							
PARAMETER			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 PARAMETERS							
Maximum withstanding isolation voltage		V _{ISO}	5000	V _{RMS}			
Maximum transient isolation voltage		VIOTM	8000	V _{peak}			
Maximum repetitive peak isolation voltage		V _{IORM}	890	V _{peak}			
Insulation resistance	$T_{amb} = 25 \ ^{\circ}C, V_{DC} = 500 \ V$	R _{IO}	≥ 10 ¹²	Ω			
Isolation resistance	$T_{amb} = 100 \ ^{\circ}C, V_{DC} = 500 \ V$	R _{IO}	≥ 10 ¹¹	Ω			
Climatic classification (according to IEC 68 part 1)			55/115/21				
Environment (pollution degree in accordance to DIN VDE 0109)			2				
Croopage distance	Standard DIP-4		≥7	mm			
Greepage distance	SMD		≥7	mm			
Clearance distance	Standard DIP-4		≥8	mm			
	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.

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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

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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

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PACKAGE DIMENSIONS in millimeters





Option 6

Option 7

Option 9







20802-34

PACKAGE MARKING (Example of CNY17F-2x017T)

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



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