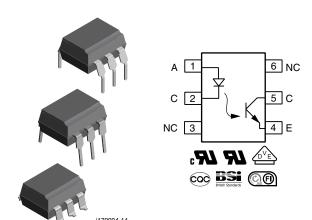


Optocoupler, Phototransistor Output, no Base Connection, 110 °C Rated



DESCRIPTION

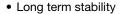
The CNY117F is a 110 °C rated optocoupler consisting of a gallium arsenide infrared emitting diode optically coupled to a silicon planar phototransistor detector in a plastic plug-in DIP-6 package.

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 CNY117 series, the base terminal of the F type is not connected, resulting in a substantially improved common-mode interference immunity.

FEATURES

- Operating temperature from -55 °C to +110 °C
- No base terminal connection for improved common mode interface immunity



- · Industry standard dual-in-line package
- Material categorization: For definitions of compliance please see <u>www.vishay.com/doc?99912</u>

e3

ROHS

APPLICATIONS

- AC adapter
- SMPS
- PLC
- · Factory automation
- · Game consoles

AGENCY APPROVALS

- 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

ORDERING INFORMATION							
C N Y 1 1 7 F - # X 0 # # T PART NUMBER CTR PACKAGE OPTION TAPE AND REEL Option 7 Option 7							
AGENCY CERTIFIED/PACKAGE		CTR	l (%)				
UL, cUL, BSI	40 to 80	63 to 125	100 to 200	160 to 320			
DIP-6	CNY117F-1	CNY117F-2	CNY117F-3	CNY117F-4			
DIP-6, 400 mil, option 6	CNY117F-1X006	CNY117F-2X006	CNY117F-3X006	CNY117F-4X006			
SMD-6, option 7	CNY117F-1X007T	CNY117F-2X007T	CNY117F-3X007T	CNY117F-4X007T			
VDE, UL, cUL, BSI	/DE, UL, cUL, BSI 40 to 80 63 to 125 100 to 200 160 to 320						
DIP-6	CNY117F-1X001	CNY117F-2X001	CNY117F-3X001	CNY117F-4X001			
DIP-6, 400 mil, option 6	CNY117F-1X016	CNY117F-2X016	CNY117F-3X016	CNY117F-4X016			
SMD-6, option 7	CNY117F-1X017T	CNY117F-2X017T	CNY117F-3X017T	CNY117F-4X017T			

Note

Additional options may be possible, please contact sales office.



ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °C, unless otherwise specified)								
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT				
INPUT								
Reverse voltage		V_{R}	6.0	V				
DC forward current		I _F	60	mA				
Surge forward current	t ≤ 10 μs	I _{FSM}	2.5	Α				
Power dissipation		P _{diss}	100	mW				
OUTPUT								
Collector emitter breakdown voltage		BV _{CEO}	70	V				
Collector current		I _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				
Soldering temperature (1)	2 mm from case, ≤ 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).

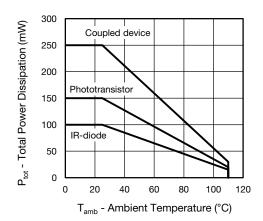


Fig. 1 - Total Power Dissipation vs. Ambient Temperature

ELECTRICAL CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT							
Forward voltage	$I_F = 60 \text{ mA}$		V_{F}		1.39	1.65	٧
Breakdown voltage	I _R = 10 μA		V_{BR}	6.0			V
Reverse current	$V_{R} = 6.0 \text{ V}$		I _R		0.01	10	μA
Capacitance	$V_R = 0 V, f = 1.0 MHz$		Co		25		pF
OUTPUT	OUTPUT						
Collector emitter capacitance	$V_{CE} = 5.0 \text{ V}, f = 1.0 \text{ MHz}$		C _{CE}		5.2		pF
Base collector capacitance	V _{CE} = 5.0 V, f = 1.0 MHz		C _{BC}		6.5		pF
Emitter base capacitance	$V_{CE} = 5.0 \text{ V}, f = 1.0 \text{ MHz}$		C _{EB}		7.5		pF



www.vishay.com

Vishay Semiconductors

ELECTRICAL CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified)								
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT	
COUPLER	COUPLER							
Collector emitter, saturation voltage	$I_F = 10 \text{ mA}, I_C = 2.5 \text{ mA}$		V _{CEsat}		0.25	0.4	٧	
Coupling capacitance			C _C		0.6		pF	
		CNY117F-1	I _{CEO}		2.0	50	nA	
Collector emitter, leakage current	V _{CE} = 10 V	CNY117F-2	I _{CEO}		2.0	50	nA	
		CNY117F-3	I _{CEO}		5.0	100	nA	
		CNY117F-4	I _{CEO}		5.0	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								
Current transfer ratio	I _F = 10 mA	CNY117F-1	CTR	40		80	%		
		CNY117F-2	CTR	63		125	%		
		CNY117F-3	CTR	100		200	%		
		CNY117F-4	CTR	160		320	%		
	I _F = 1.0 mA	CNY117F-1	CTR	13	30		%		
		CNY117F-2	CTR	22	45		%		
		CNY117F-3	CTR	34	70		%		
		CNY117F-4	CTR	56	90		%		

Note

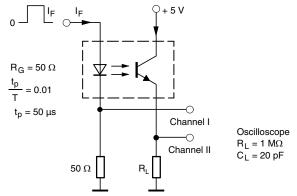
• Current transfer ratio I_C/I_F at V_{CE} = 5.0 V, 25 °C and collector emitter leakage current by dash number.

SWITCHING CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
LINEAR OPERATION (with	nout saturation)						
Turn-on time	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω		t _{on}		3.0		μs
Rise time	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω		t _r		2.0		μs
Turn-off time	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω		t _{off}		2.3		μs
Fall time	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω		t _f		2.0		μs
Cut-off frequency	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω		f _{CO}		110		kHz
SWITCHING OPERATION	(with saturation)						
	I _F = 20 mA	CNY117F-1	t _{on}		3.0		μs
Turn-on time	I _E = 10 mA	CNY117F-2	t _{on}		4.2		μs
rum-on ume	IF = 10 IIIA	CNY117F-3	t _{on}		4.2		μs
	$I_F = 5.0 \text{ mA}$	CNY117F-4	t _{on}		6.0		μs
	I _F = 20 mA	CNY117F-1	t _r		2.0		μs
Rise time	I _E = 10 mA	CNY117F-2	t _r		3.0		μs
nise time	IF = 10 IIIA	CNY117F-3	t _r		3.0		μs
	$I_F = 5.0 \text{ mA}$	CNY117F-4	t _r		4.6		μs
	$I_F = 20 \text{ mA}$	CNY117F-1	t _{off}		18		μs
Turn-off time	I _E = 10 mA	CNY117F-2	t _{off}		23		μs
Turn-on time	IF = 10 IIIA	CNY117F-3	t _{off}		23		μs
	$I_{F} = 5.0 \text{ mA}$	CNY117F-4	t _{off}		25		μs
	I _F = 20 mA	CNY117F-1	t _f		11		μs
Fall time	I _F = 10 mA	CNY117F-2	t _f		14		μs
i ali tiille		CNY117F-3	t _f		14		μs
	$I_F = 5.0 \text{ mA}$	CNY117F-4	t _f		15		μs



www.vishay.com

Vishay Semiconductors



95 10804-3

Fig. 2 - Test Circuit, Non-Saturated Operation

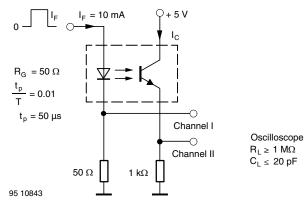


Fig. 3 - Test Circuit, Saturated Operation

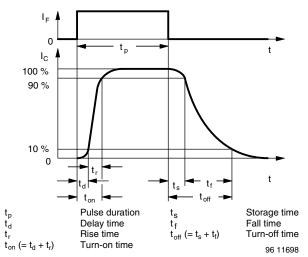


Fig. 4 - Switching Times

SAFETY AND INSULATIO	N RATINGS			
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 PARAMETER	RS			
Maximum withstanding isolation vol	tage	V _{ISO}	5000	V_{RMS}
Maximum transient isolation voltage		V _{IOTM}	8000	V_{peak}
Maximum repetitive peak isolation v	oltage	V _{IORM}	890	V_{peak}
Insulation resistance	$T_{amb} = 25 ^{\circ}\text{C}, V_{DC} = 500 \text{V}$	R _{IO}	≥ 10 ¹²	Ω
Isolation resistance	T _{amb} = 100 °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 acc	cordance to DIN VDE 0109)		2	
Crosses 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)

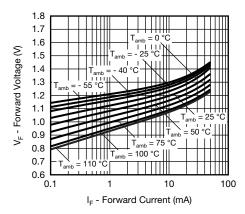


Fig. 5 - Forward Voltage vs. Forward Current

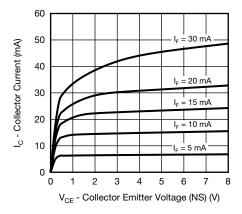


Fig. 6 - Collector Current vs. Collector Emitter Voltage (NS)

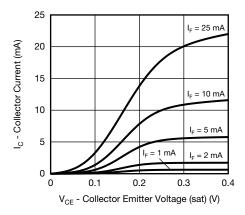


Fig. 7 - Collector Current vs. Collector Emitter Voltage (sat)

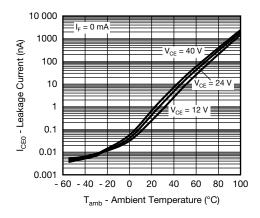


Fig. 8 - Leakage Current vs. Ambient Temperature

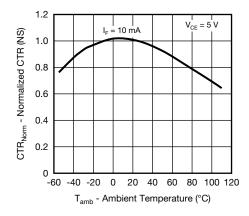


Fig. 9 - Normalized CTR (NS) vs. Ambient Temperature

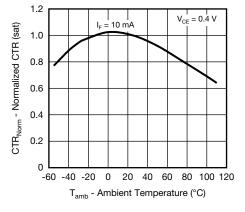


Fig. 10 - Normalized CTR (sat) vs. Ambient Temperature





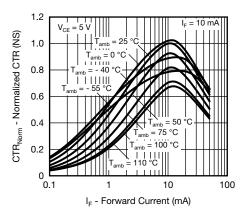


Fig. 11 - Normalized CTR (NS) vs. Forward Current

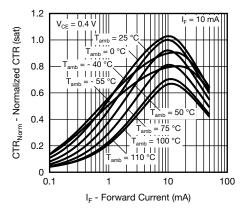


Fig. 12 - Normalized CTR (sat) vs. Forward Current

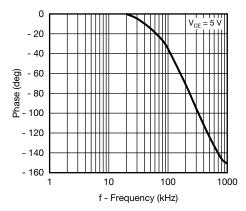


Fig. 13 - CTR Frequency vs. Phase Angle

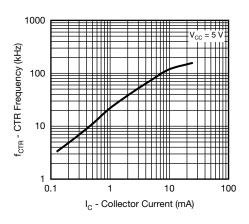


Fig. 14 - CTR -3 dB Frequency vs. Collector Current

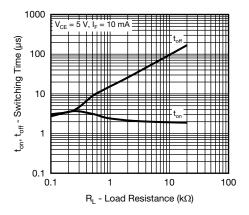
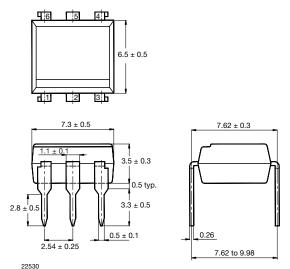


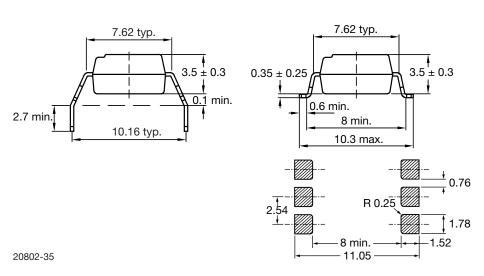
Fig. 15 - Switching Time vs. Load Resistance

PACKAGE DIMENSIONS in millimeters

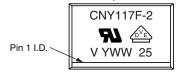


Option 6

Option 7



PACKAGE MARKING (Example of CNY117F-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

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

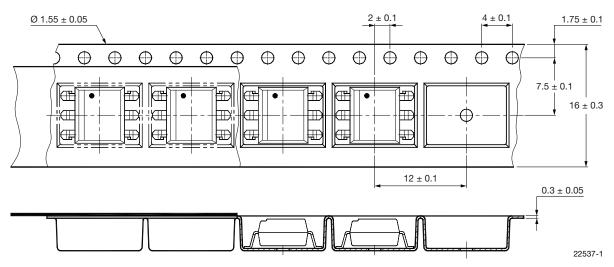


Fig. 16 - Tape and Reel Drawing, 1000 Units per Reel



Legal Disclaimer Notice

Vishay

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.