

# Optocoupler, Phototransistor Output, no Base Connection



i179004-14



## FEATURES

- Isolation test voltage, 5000 V<sub>RMS</sub>
- No base terminal connection for improved common mode interface immunity
- Long term stability
- Industry standard dual-in-line package
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



RoHS COMPLIANT

## 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
- CQC

## 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 connected, resulting in a substantially improved common-mode interference immunity.

ORDERING INFORMATION					
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px;">C</div> <div style="border: 1px solid black; padding: 2px 5px;">N</div> <div style="border: 1px solid black; padding: 2px 5px;">Y</div> <div style="border: 1px solid black; padding: 2px 5px;">1</div> <div style="border: 1px solid black; padding: 2px 5px;">7</div> <div style="border: 1px solid black; padding: 2px 5px;">F</div> <div style="border: 1px solid black; padding: 2px 5px;">-</div> <div style="border: 1px solid black; padding: 2px 5px;">#</div> <div style="border: 1px solid black; padding: 2px 5px;">X</div> <div style="border: 1px solid black; padding: 2px 5px;">0</div> <div style="border: 1px solid black; padding: 2px 5px;">#</div> <div style="border: 1px solid black; padding: 2px 5px;">#</div> <div style="border: 1px solid black; padding: 2px 5px;">T</div> </div>	PART NUMBER		CTR BIN	PACKAGE OPTION	TAPE AND REEL
		DIP-6 7.62 mm	Option 6 10.16 mm	Option 7 > 8 mm	Option 9 8 mm typ.
AGENCY CERTIFIED/PACKAGE	CTR (%)				
UL, cUL, BSI, FIMKO	40 to 80	63 to 125	100 to 200	160 to 320	
DIP-6	CNY17F-1	CNY17F-2	CNY17F-3	CNY17F-4	
DIP-6, 400 mil, option 6	CNY17F-1X006	CNY17F-2X006	CNY17F-3X006	CNY17F-4X006	
SMD-6, option 7	CNY17F-1X007 <sup>(1)</sup>	CNY17F-2X007T <sup>(1)</sup>	CNY17F-3X007T <sup>(1)</sup>	CNY17F-4X007T <sup>(1)</sup>	
SMD-6, option 9	CNY17F-1X009T <sup>(1)</sup>	CNY17F-2X009T <sup>(1)</sup>	CNY17F-3X009T <sup>(1)</sup>	CNY17F-4X009T <sup>(1)</sup>	
VDE, UL, cUL, BSI, FIMKO	40 to 80	63 to 125	100 to 200	160 to 320	
DIP-6	CNY17F-1X001	CNY17F-2X001	CNY17F-3X001	CNY17F-4X001	
DIP-6, 400 mil, option 6	CNY17F-1X016	CNY17F-2X016	CNY17F-3X016	CNY17F-4X016	
SMD-6, option 7	CNY17F-1X017 <sup>(1)</sup>	CNY17F-2X017 <sup>(1)</sup>	CNY17F-3X017 <sup>(1)</sup>	CNY17F-4X017 <sup>(1)</sup>	
SMD-6, option 9	CNY17F-1X019	CNY17F-2X019 <sup>(1)</sup>	CNY17F-3X019 <sup>(1)</sup>	-	

## Notes

- Additional options may be possible, please contact sales office.
- <sup>(1)</sup> Also available in tubes; do not put T on end.



<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		$V_R$	6	V
DC forward current		$I_F$	60	mA
Surge forward current	$t \leq 10\text{ }\mu\text{s}$	$I_{FSM}$	2.5	A
Power dissipation		$P_{diss}$	70	mW
<b>OUTPUT</b>				
Collector emitter breakdown voltage		$BV_{CEO}$	70	V
Collector current		$I_C$	50	mA
Collector peak current	$t_p/T = 0.5, t_p \leq 10\text{ ms}$	$I_{CM}$	100	mA
Output power dissipation		$P_{diss}$	150	mW
<b>COUPLER</b>				
Isolation test voltage between emitter and detector	$t = 1\text{ min}$	$V_{ISO}$	5000	$V_{RMS}$
Creepage distance			$\geq 7$	mm
Clearance distance			$\geq 7$	mm
Isolation thickness between emitter and detector			$\geq 0.4$	mm
Comparative tracking index per DIN IEC 112/VDE 0303, part 1			$\geq 175$	
Isolation resistance	$V_{IO} = 500\text{ V}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
Storage temperature range		$T_{stg}$	- 55 to + 150	$^{\circ}\text{C}$
Ambient temperature range		$T_{amb}$	- 55 to + 110	$^{\circ}\text{C}$
Junction temperature		$T_j$	100	$^{\circ}\text{C}$
Soldering temperature <sup>(1)</sup>	2 mm from case, $\leq 10\text{ s}$	$T_{sld}$	260	$^{\circ}\text{C}$
Total power dissipation		$P_{diss}$	220	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.
- Refer to reflow profile for soldering conditions for surface mounted parts (SMD). Refer to wave profile for soldering conditions for through hole parts (DIP).

<b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>							
Forward voltage	$I_F = 60\text{ mA}$		$V_F$		1.39	1.65	V
Breakdown voltage	$I_R = 10\text{ }\mu\text{A}$		$V_{BR}$	6			V
Reverse current	$V_R = 6\text{ V}$		$I_R$		0.01	10	$\mu\text{A}$
Capacitance	$V_R = 0\text{ V}, f = 1\text{ MHz}$		$C_O$		25		pF
<b>OUTPUT</b>							
Collector emitter capacitance	$V_{CE} = 5\text{ V}, f = 1\text{ MHz}$		$C_{CE}$		5.2		pF
Base collector capacitance	$V_{CE} = 5\text{ V}, f = 1\text{ MHz}$		$C_{BC}$		6.5		pF
Emitter base capacitance	$V_{CE} = 5\text{ V}, f = 1\text{ MHz}$		$C_{EB}$		7.5		pF
<b>COUPLER</b>							
Collector emitter, saturation voltage	$I_F = 10\text{ mA}, I_C = 2.5\text{ mA}$		$V_{CEsat}$		0.25	0.4	V
Coupling capacitance			$C_C$		0.6		pF
Collector emitter, leakage current	$V_{CE} = 10\text{ V}$	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 requirements. 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.



<b>CURRENT TRANSFER RATIO</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
$I_C/I_F$	$I_F = 10\text{ mA}$	CNY17F-1	CTR	40		80	%
		CNY17F-2	CTR	63		125	%
		CNY17F-3	CTR	100		200	%
		CNY17F-4	CTR	160		320	%
	$I_F = 1\text{ mA}$	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  $V_{CE} = 5\text{ V}$ ,  $25\text{ }^{\circ}\text{C}$  and collector emitter leakage current by dash number.

<b>SWITCHING CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>LINEAR OPERATION</b> (without saturation)							
Turn-on time	$I_F = 10\text{ mA}$ , $V_{CC} = 5\text{ V}$ , $R_L = 75\text{ }\Omega$		$t_{on}$		3		$\mu\text{s}$
Rise time	$I_F = 10\text{ mA}$ , $V_{CC} = 5\text{ V}$ , $R_L = 75\text{ }\Omega$		$t_r$		2		$\mu\text{s}$
Turn-off time	$I_F = 10\text{ mA}$ , $V_{CC} = 5\text{ V}$ , $R_L = 75\text{ }\Omega$		$t_{off}$		2.3		$\mu\text{s}$
Fall time	$I_F = 10\text{ mA}$ , $V_{CC} = 5\text{ V}$ , $R_L = 75\text{ }\Omega$		$t_f$		2		$\mu\text{s}$
Cut-off frequency	$I_F = 10\text{ mA}$ , $V_{CC} = 5\text{ V}$ , $R_L = 75\text{ }\Omega$		$f_{CO}$		110		kHz
<b>SWITCHING OPERATION</b> (with saturation)							
Turn-on time	$I_F = 20\text{ mA}$	CNY17F-1	$t_{on}$		3		$\mu\text{s}$
	$I_F = 10\text{ mA}$	CNY17F-2	$t_{on}$		4.2		$\mu\text{s}$
		CNY17F-3	$t_{on}$		4.2		$\mu\text{s}$
		CNY17F-4	$t_{on}$		6		$\mu\text{s}$
Rise time	$I_F = 20\text{ mA}$	CNY17F-1	$t_r$		2		$\mu\text{s}$
	$I_F = 10\text{ mA}$	CNY17F-2	$t_r$		3		$\mu\text{s}$
		CNY17F-3	$t_r$		3		$\mu\text{s}$
		CNY17F-4	$t_r$		4.6		$\mu\text{s}$
Turn-off time	$I_F = 20\text{ mA}$	CNY17F-1	$t_{off}$		18		$\mu\text{s}$
	$I_F = 10\text{ mA}$	CNY17F-2	$t_{off}$		23		$\mu\text{s}$
		CNY17F-3	$t_{off}$		23		$\mu\text{s}$
		CNY17F-4	$t_{off}$		25		$\mu\text{s}$
Fall time	$I_F = 20\text{ mA}$	CNY17F-1	$t_f$		11		$\mu\text{s}$
	$I_F = 10\text{ mA}$	CNY17F-2	$t_f$		14		$\mu\text{s}$
		CNY17F-3	$t_f$		14		$\mu\text{s}$
		CNY17F-4	$t_f$		15		$\mu\text{s}$



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Fig. 1 - Test Circuit, Non-Saturated Operation



$t_p$	Pulse duration	$t_s$	Storage time
$t_d$	Delay time	$t_f$	Fall time
$t_r$	Rise time	$t_{off} (= t_s + t_f)$	Turn-off time
$t_{on} (= t_d + t_r)$	Turn-on time		

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Fig. 3 - Switching Times



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Fig. 2 - Test Circuit, Saturated Operation

**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^\circ\text{C}$ , unless otherwise specified)



Fig. 4 - Forward Voltage vs. Forward Current



Fig. 5 - Collector Current vs. Collector Emitter Voltage (NS)



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



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

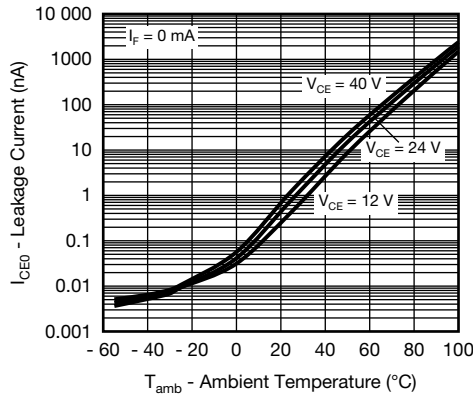


Fig. 7 - Leakage Current vs. Ambient Temperature

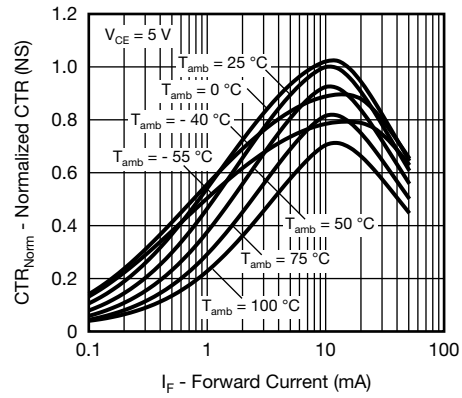


Fig. 10 - Normalized CTR (NS) vs. Forward Current



Fig. 8 - Normalized CTR (NS) vs. Ambient Temperature



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

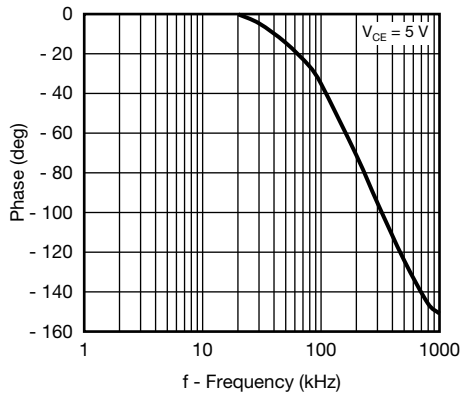


Fig. 12 - CTR Frequency vs. Phase Angle

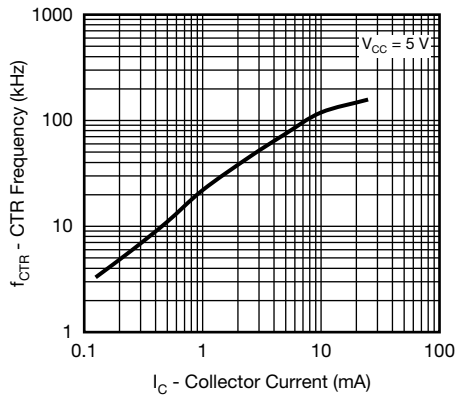


Fig. 13 - CTR Frequency vs. Collector Current

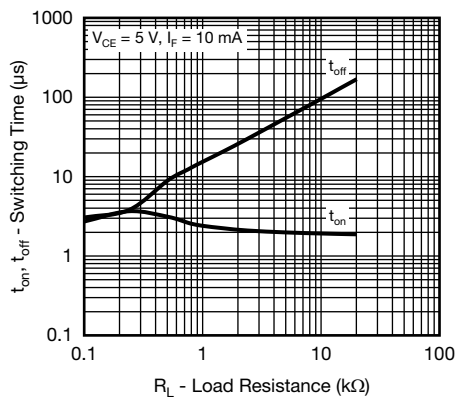


Fig. 14 - Switching Time vs. Load Resistance

**PACKAGE DIMENSIONS** in millimeters

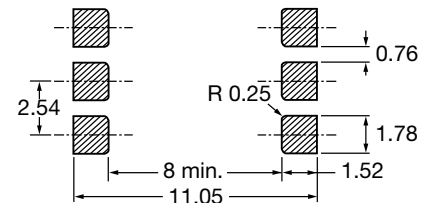
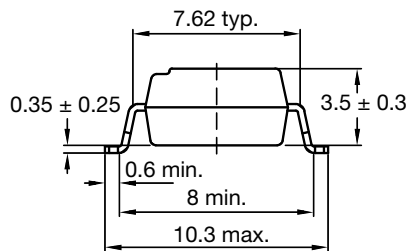
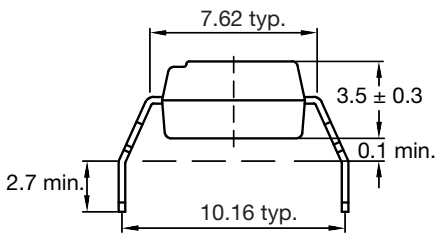


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**Option 6**

**Option 7**

**Option 9**



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**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. 15 - Tape and Reel Drawing, 1000 Units per Reel





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