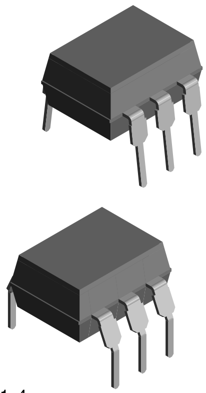
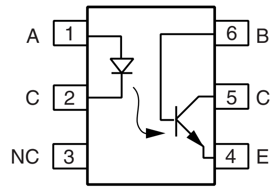
Optocoupler, Phototransistor Output, with Base Connection



17201_4



i179004-4

FEATURES

- Isolation test voltage 5000 V_{RMS}
- Long term stability
- Industry standard dual-in-line package
- V_{IORM} = 850 V
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

AGENCY APPROVALS

- Underwriters lab file no. E52744
- DIN EN 60747-5-5 (0884-5) available with option 1
- BSI IEC 60950-1:2006 IEC 60065
- FIMKO
- CQC

DESCRIPTION

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

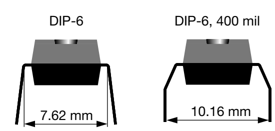
Signal information, including a DC level, can be transmitted by the device while maintaining a high degree of electrical isolation between input and output.

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

ORDERING INFORMATION

C	N	Y	1	7	-	#

PART NUMBER



AGENCY CERTIFIED/PACKAGE	CTR (%)			
cUL, VDE, BSI, FIMKO, CQC	**40 to 80**	**63 to 125**	**100 to 200**	**160 to 320**
DIP-6	CNY17-1	CNY17-2	CNY17-3	CNY17-4
DIP-6, 400 mil	CNY17G-1	CNY17G-2	CNY17G-3	CNY17G-4

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Reverse voltage		V_R	5	V
Forward current		I_F	60	mA
Surge current	t ≤ 10 μs	I_{FSM}	3	A
Power dissipation		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
	t < 1 ms	I_C	100	mA
Power dissipation		P_{diss}	150	mW

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
COUPLER				
Isolation test voltage between emitter and detector referred to climate DIN 50014, part 2, Nov. 74	t = 1 min	V_{ISO}	5000	V_{RMS}
Creepage distance			≥ 7	mm
Clearance distance			≥ 7	mm
Isolation thickness between emitter and detector			≥ 0.4	mm
Comparative tracking index per DIN IEC 112/VDE 0303, part 1			250	
Isolation resistance	V_{IO} = 500 V, T_{amb} = 25 °C	R_{IO}	≥ 10^{12}	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	≥ 10^{11}	Ω
Storage temperature		T_{stg}	- 55 to + 125	°C
Operating temperature		T_{amb}	- 55 to + 100	°C
Soldering temperature (1)	max. 10 s, dip soldering: distance to seating plane ≥ 1.5 mm	T_{sld}	260	°C

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 wave profile for soldering conditions for through hole devices.

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		1.25	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		C_O		25		pF
Thermal resistance			R_{th}		750		K/W
OUTPUT							
Collector emitter capacitance	V_{CE} = 5 V, f = 1 MHz		C_{CE}		5.2		pF
Collector base capacitance	V_{CB} = 5 V, f = 1 MHz		C_{CB}		6.5		pF
Emitter base capacitance	V_{EB} = 5 V, f = 1 MHz		C_{EB}		7.5		pF
Thermal resistance			R_{th}		500		K/W
COUPLER							
Collector emitter, saturation voltage	I_F = 10 mA, I_C = 2.5 mA		V_{CEsat}		0.25	0.4	V
Coupling capacitance			C_C		0.6		pF
Collector emitter, leakage current	V_{CE} = 10 V	CNY17-1	I_{CEO}		2	50	nA
		CNY17-2	I_{CEO}		2	50	nA
		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							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
I_C/I_F	V_{CE} = 5 V, I_F = 10 mA	CNY17-1	CTR	40		80	%
		CNY17-2	CTR	63		125	%
		CNY17-3	CTR	100		200	%
		CNY17-4	CTR	160		320	%
	V_{CE} = 5 V, I_F = 1 mA	CNY17-1	CTR	13	30		%
		CNY17-2	CTR	22	45		%
		CNY17-3	CTR	34	70		%
		CNY17-4	CTR	56	90		%

Note

- Current transfer ratio and collector-emitter leakage current by dash number (T_{amb} °C).

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}		250		kHz
SWITCHING OPERATION (WITH SATURATION)							
Turn-on time	I_F = 20 mA	CNY17-1	t_{on}		3		µs
	I_F = 10 mA	CNY17-2	t_{on}		4.2		µs
		CNY17-3	t_{on}		4.2		µs
	I_F = 5 mA	CNY17-4	t_{on}		6		µs
Rise time	I_F = 20 mA	CNY17-1	t_r		2		µs
	I_F = 10 mA	CNY17-2	t_r		3		µs
		CNY17-3	t_r		3		µs
	I_F = 5 mA	CNY17-4	t_r		4.6		µs
Turn-off time	I_F = 20 mA	CNY17-1	t_{off}		18		µs
	I_F = 10 mA	CNY17-2	t_{off}		23		µs
		CNY17-3	t_{off}		23		µs
	I_F = 5 mA	CNY17-4	t_{off}		25		µs
Fall time	I_F = 20 mA	CNY17-1	t_f		11		µs
	I_F = 10 mA	CNY17-2	t_f		14		µs
		CNY17-3	t_f		14		µs
	I_F = 5 mA	CNY17-4	t_f		15		µs

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

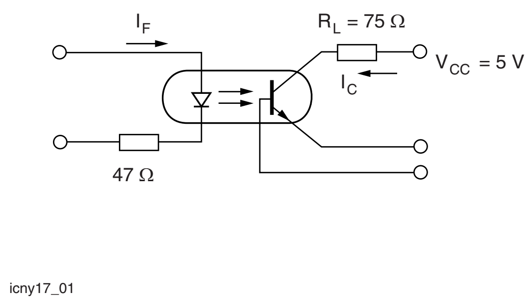


Fig. 1 - Linear Operation (without Saturation)

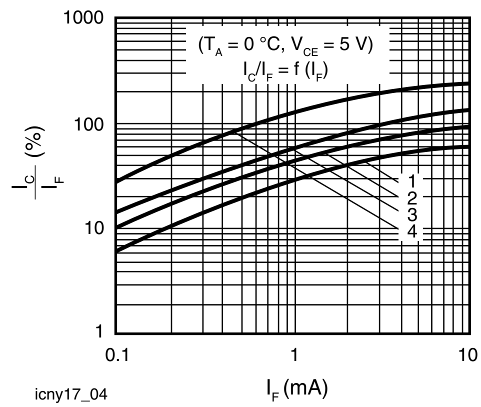


Fig. 4 - Current Transfer Ratio vs. Diode Current

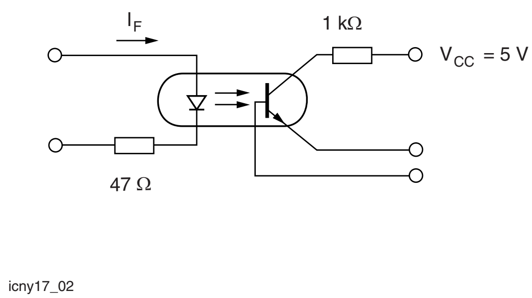


Fig. 2 - Switching Operation (with Saturation)

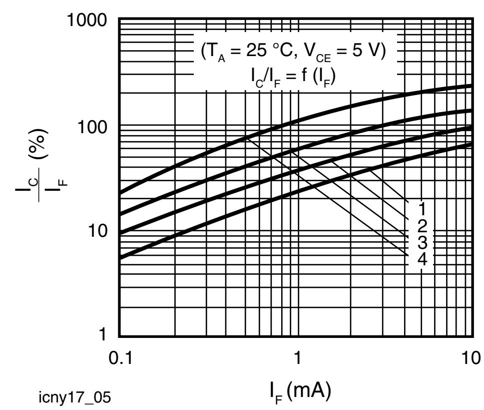


Fig. 5 - Current Transfer Ratio vs. Diode Current

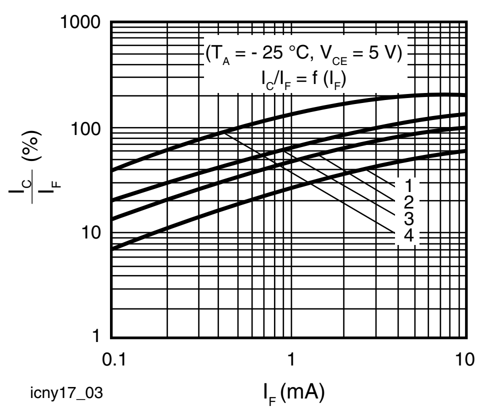


Fig. 3 - Current Transfer Ratio vs. Diode Current

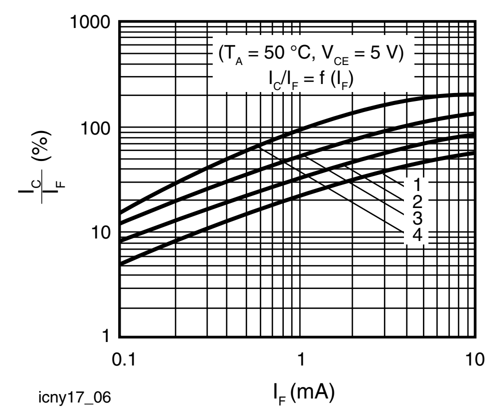


Fig. 6 - Current Transfer Ratio vs. Diode Current

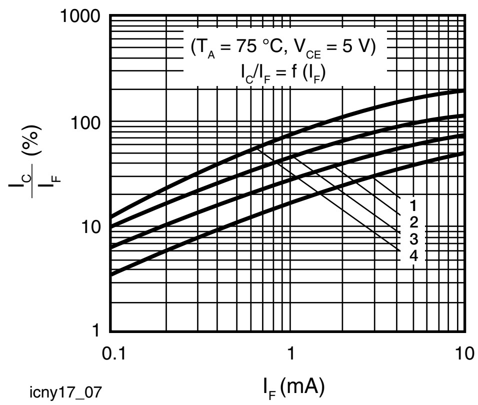


Fig. 7 - Current Transfer Ratio vs. Diode Current

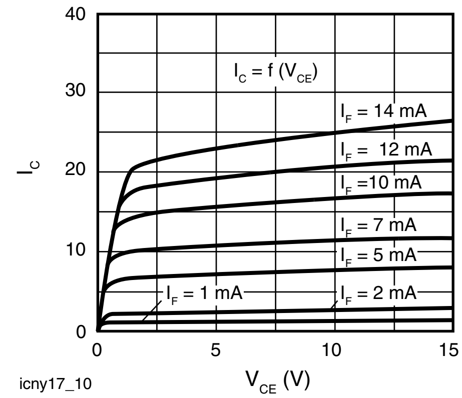


Fig. 10 - Output Characteristics

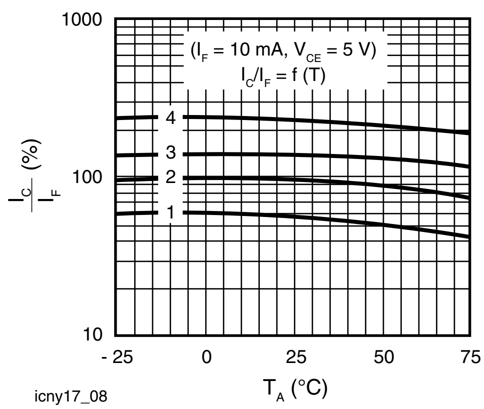


Fig. 8 - Current Transfer Ratio (CTR) vs. Temperature

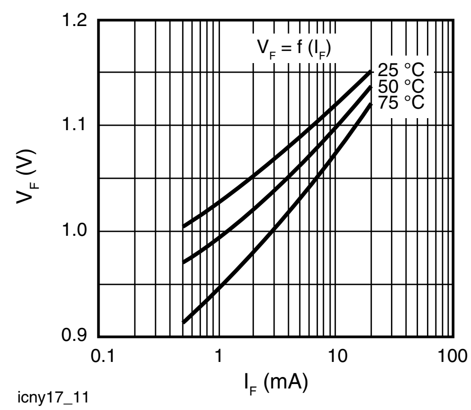


Fig. 11 - Forward Voltage

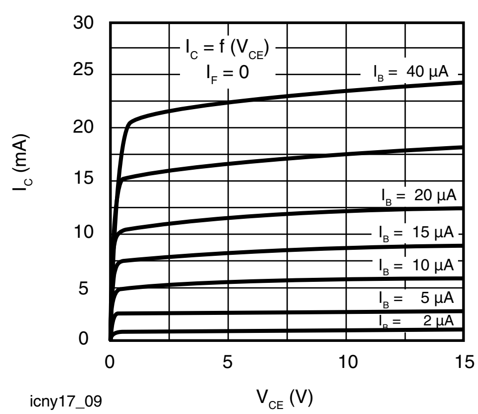


Fig. 9 - Transistor Characteristics

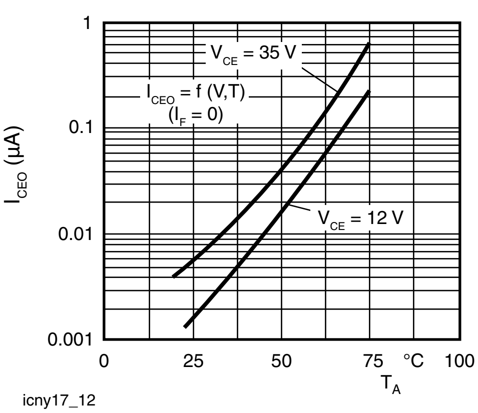


Fig. 12 - Collector Emitter Off-state Current

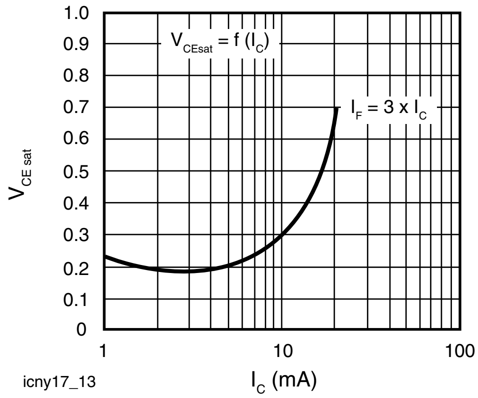


Fig. 13 - Saturation Voltage vs.
Collector Current and Modulation Depth CNY17-1

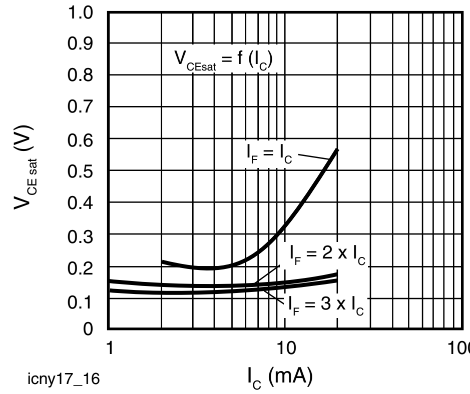


Fig. 16 - Saturation Voltage vs.
Collector Current and Modulation Depth CNY17-4

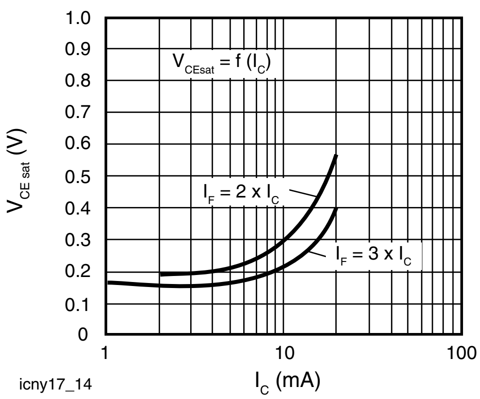


Fig. 14 - Saturation Voltage vs.
Collector Current and Modulation Depth CNY17-2

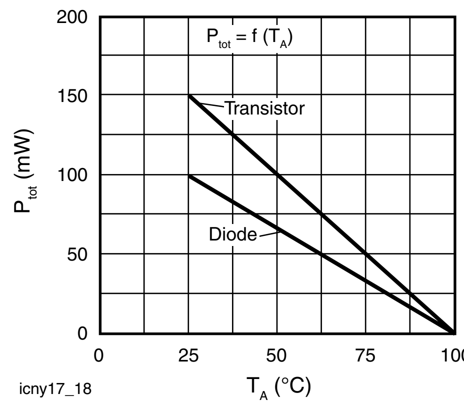


Fig. 17 - Permissible Power Dissipation for Transistor and Diode

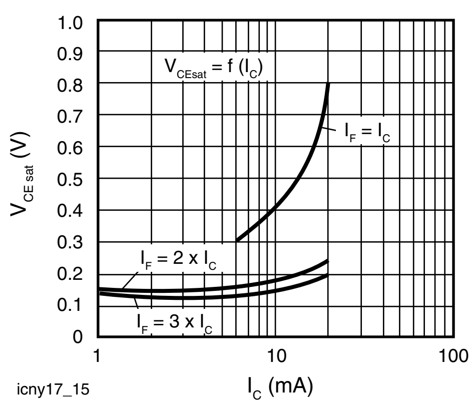
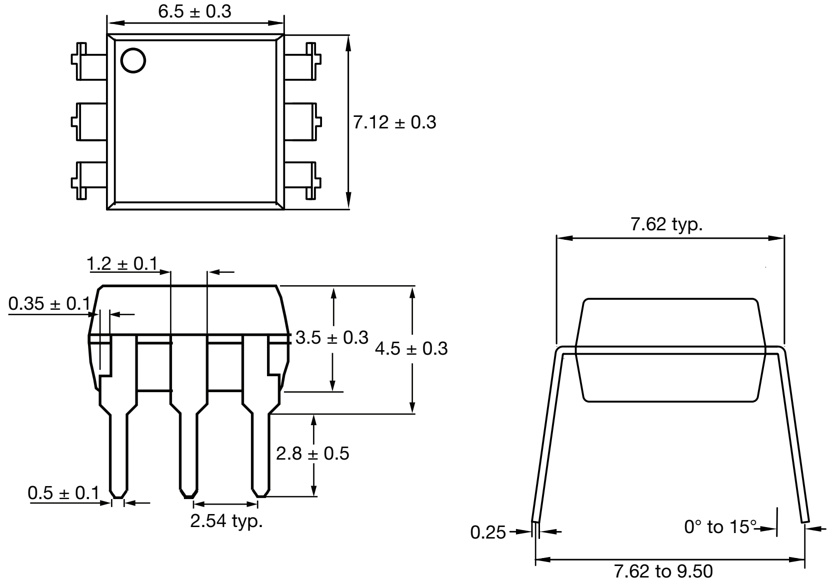


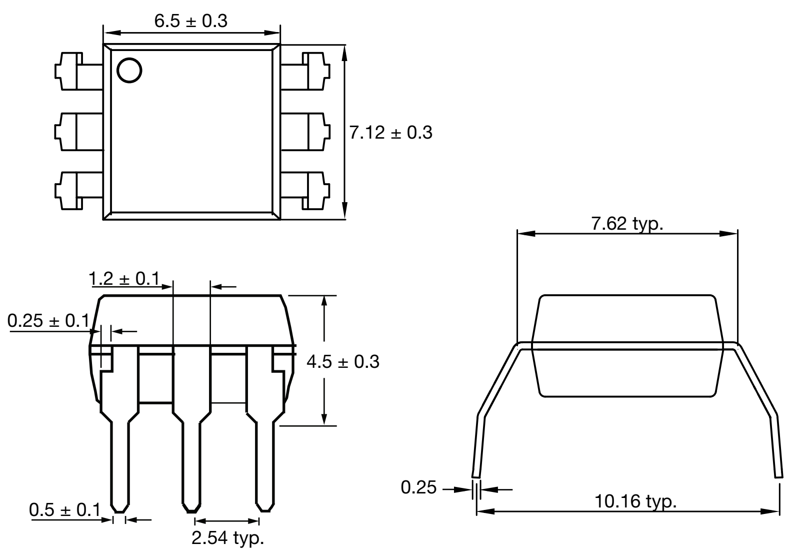
Fig. 15 - Saturation Voltage vs.
Collector Current and Modulation Depth CNY17-3

PACKAGE DIMENSIONS in millimeters

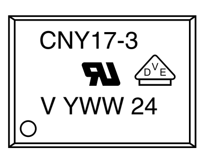
DIP-6



DIP-6, 400 mil



PACKAGE MARKING



For technical questions, contact: optocoupleranswers@vishay.com

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