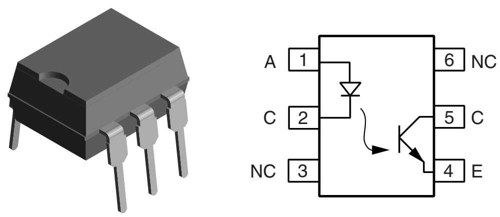
Optocoupler, Phototransistor Output, no Base Connection, 110 °C Rated



18216

FEATURES

- Operating temperature from - 55 °C to + 110 °C
- No base terminal connection for improved common mode interface immunity
- Long term stability
- Industry standard dual-in-line package
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

Pb-free
e3
RoHS
COMPLIANT

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.

APPLICATIONS

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

AGENCY APPROVALS

- UL1577, file no. E52744 system code H or J, double protection
- DIN EN 60747-5-5

ORDER INFORMATION

PART	REMARKS
CNY117F-1	CTR 40 to 80 %, DIP-6
CNY117F-2	CTR 63 to 125 %, DIP-6
CNY117F-3	CTR 100 to 200 %, DIP-6
CNY117F-4	CTR 160 to 320 %, DIP-6

Note
For additional information on the available options refer to option information.

ABSOLUTE MAXIMUM RATINGS

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	A
Power dissipation		P_{diss}	100	mW
Derate linearly from 25 °C			1.0	mW/°C
OUTPUT				
Collector emitter breakdown voltage		BV_{CEO}	70	V
Collector current		I_C	50	mA
	t ≤ 1.0 ms	I_C	100	mA
Total power dissipation		P_{diss}	150	mW
Derate linearly from 25 °C			1.5	mW/°C

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

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
COUPLER				
Isolation test voltage between emitter and detector referred to standard climate 23/50 DIN 50014		V_{ISO}	5300	V_{RMS}
Creepage			≥ 7.0	mm
Clearance			≥ 7.0	mm
Isolation thickness between emitter and detector			≥ 0.4	mm
Comparative tracking index per DIN IEC 112/VDE 0303, part 1			175	
Isolation resistance	V_{IO} = 500 V	R_{IO}	≥ 10^{11}	Ω
Storage temperature range		T_{stg}	- 55 to + 150	°C
Ambient temperature range		T_{amb}	- 55 to + 110	°C
Soldering temperature	max. 10 s, dip soldering: distance to seating plane ≥ 1.5 mm	T_{sld}	260	°C

Note
T_{amb} = 25 °C, unless otherwise specified.
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.

ELECTRICAL CHARACTERISTCS							
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}	6.0			V
Reverse current	V_R = 6.0 V		I_R		0.01	10	µA
Capacitance	V_R = 0 V, f = 1.0 MHz		C_O		25		pF
OUTPUT							
Collector emitter capacitance	V_{CE} = 5.0 V, f = 1.0 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 V, f = 1.0 MHz		C_{EB}		7.5		pF
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	CNY117F-1	I_{CEO}		2.0	50	nA
		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
T_{amb} = 25 °C, unless otherwise specified.
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
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

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
LINEAR OPERATION (WITHOUT 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}		250		kHz
SWITCHING OPERATION (WITH SATURATION)							
Turn-on time	I_F = 20 mA	CNY117F-1	t_{on}		3.0		µs
	I_F = 10 mA	CNY117F-2	t_{on}		4.2		µs
		CNY117F-3	t_{on}		4.2		µs
	I_F = 5.0 mA	CNY117F-4	t_{on}		6.0		µs
Rise time	I_F = 20 mA	CNY117F-1	t_r		2.0		µs
	I_F = 10 mA	CNY117F-2	t_r		3.0		µs
		CNY117F-3	t_r		3.0		µs
	I_F = 5.0 mA	CNY117F-4	t_r		4.6		µs
Turn-off time	I_F = 20 mA	CNY117F-1	t_{off}		18		µs
	I_F = 10 mA	CNY117F-2	t_{off}		23		µs
		CNY117F-3	t_{off}		23		µs
	I_F = 5.0 mA	CNY117F-4	t_{off}		25		µs
Fall time	I_F = 20 mA	CNY117F-1	t_f		11		µs
	I_F = 10 mA	CNY117F-2	t_f		14		µs
		CNY117F-3	t_f		14		µs
	I_F = 5.0 mA	CNY117F-4	t_f		15		µs

TYPICAL CHARACTERISTICS

T_{amb} = 25 °C, unless otherwise specified

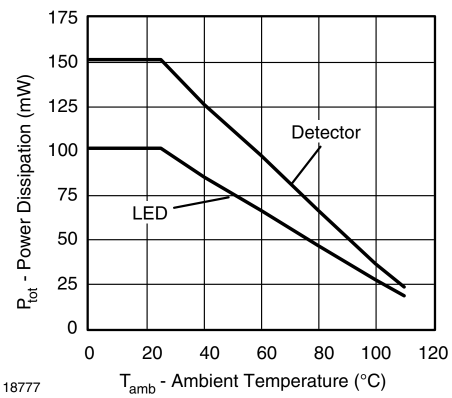


Fig. 1 - Permissible Power Dissipation vs. Ambient Temperature

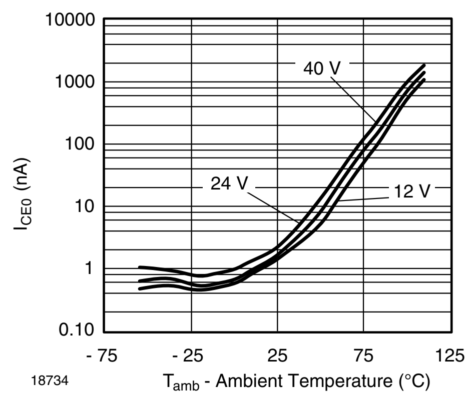


Fig. 4 - Collector to Emitter Dark Current vs. Ambient Temperature

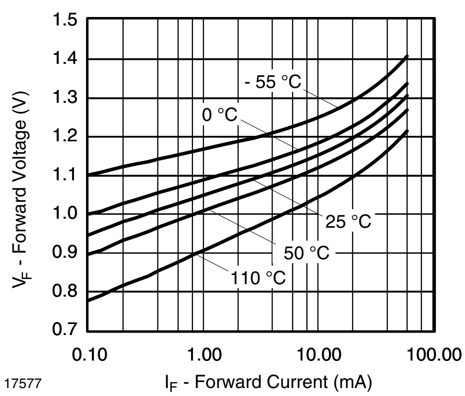


Fig. 2 - Forward Voltage vs. Forward Current

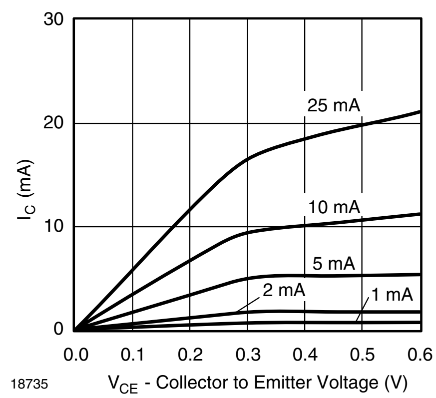


Fig. 5 - Normalized Current vs. Collector Emitter Saturation Voltage

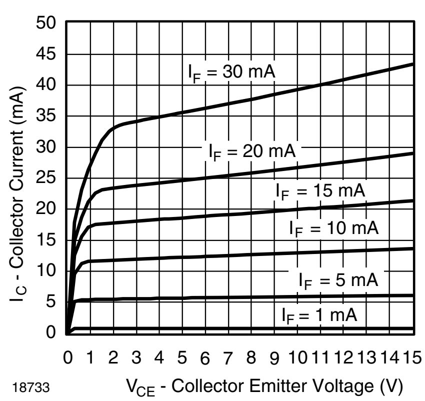


Fig. 3 - Collector Current vs. Collector Emitter Voltage

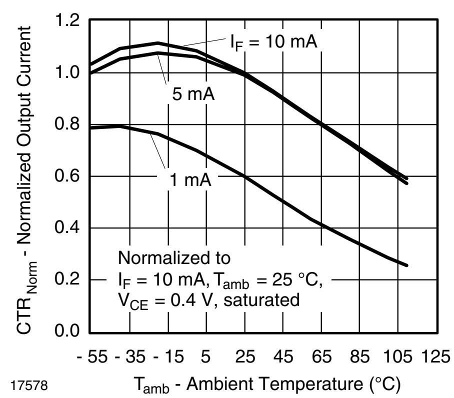


Fig. 6 - Normalized Current Transfer Ratio vs. Ambient Temperature

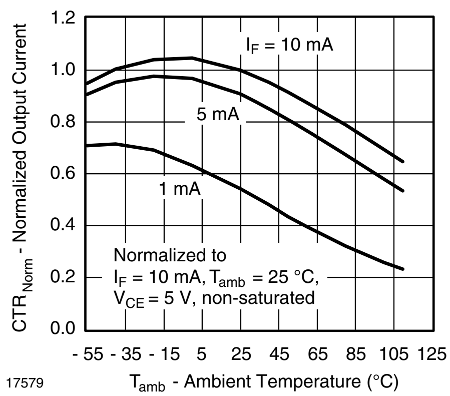


Fig. 7 - Normalized Current Transfer Ratio vs. Ambient Temperature

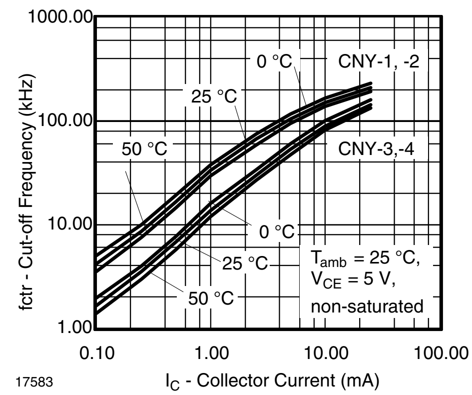


Fig. 10 - Cut-off Frequency vs. Collector Current

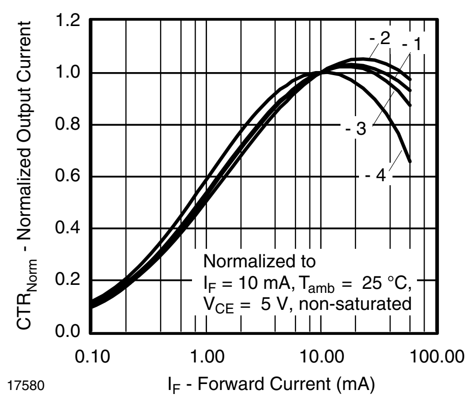


Fig. 8 - Normalized CTR vs. Forward Current

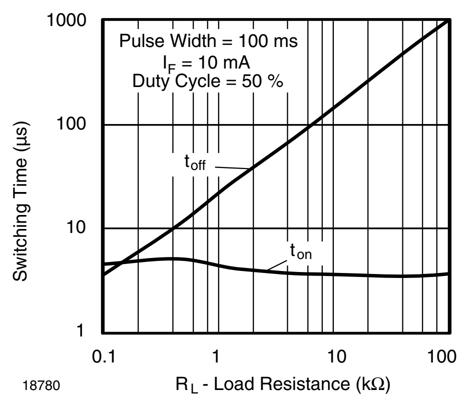


Fig. 11 - Time Switching vs. Load Resistance

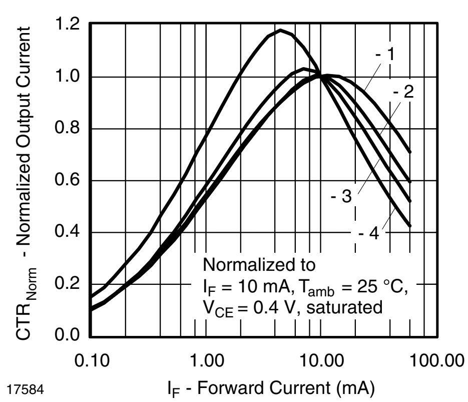


Fig. 9 - Normalized CTR vs. Forward Current

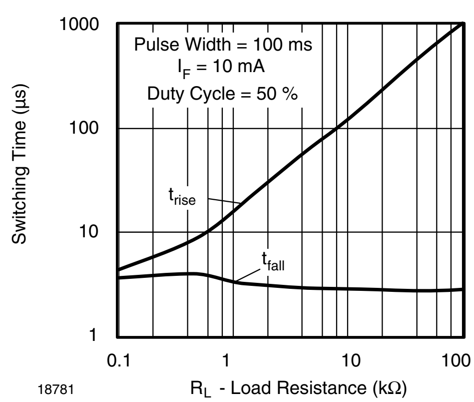


Fig. 12 - Time Switching vs. Load Resistance

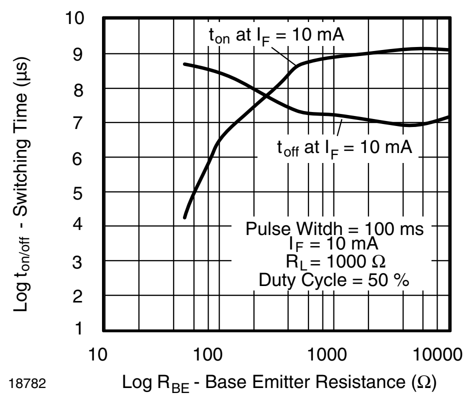


Fig. 13 - Switching Time vs. Base Emitter Resistance

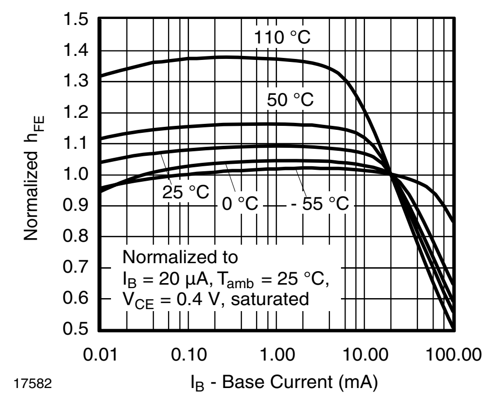


Fig. 16 - Normalized h_{FE} vs. Base Current

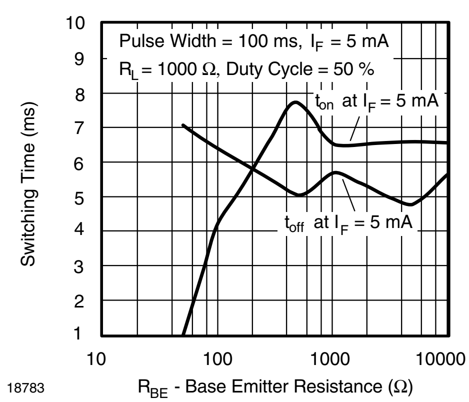


Fig. 14 - Switching Time vs. Base Emitter Resistance

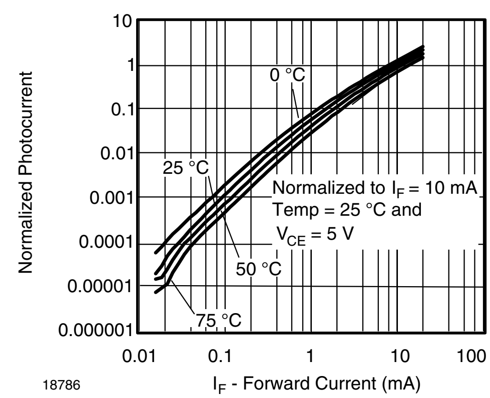


Fig. 17 - Normalized Photocurrent vs. Forward Current

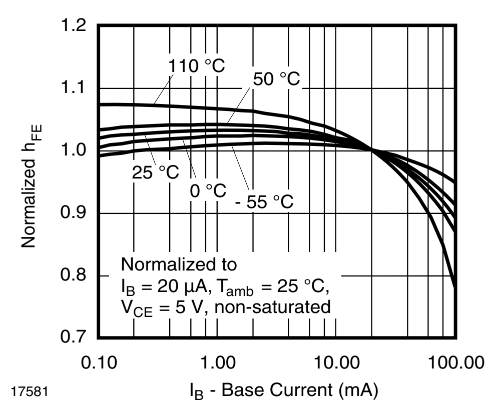
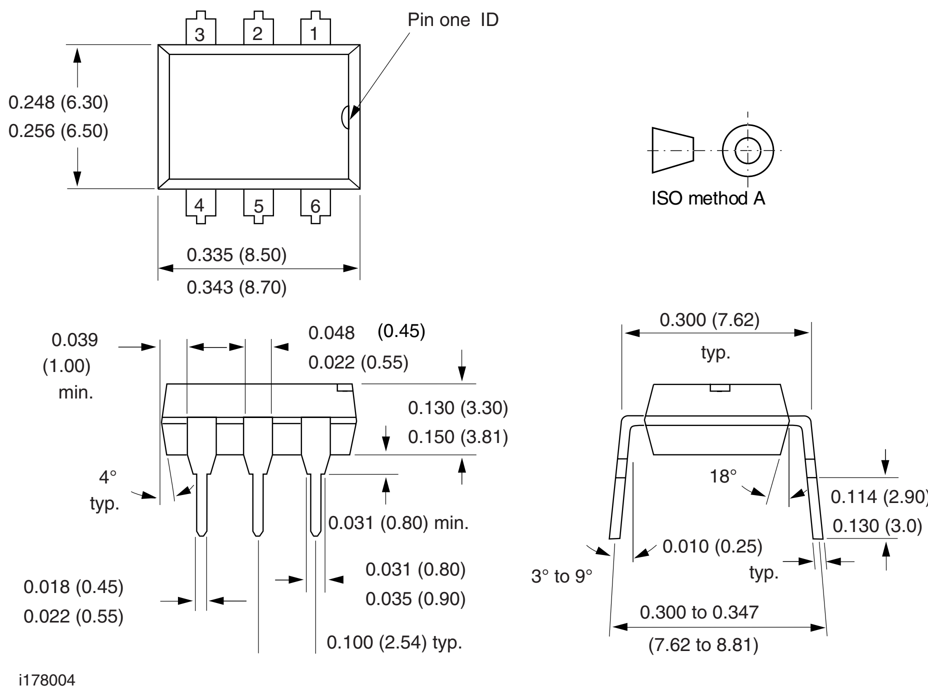


Fig. 15 - Normalized h_{FE} vs. Base Current

PACKAGE DIMENSIONS in inches (millimeters)



OZONE DEPLETING SUBSTANCES POLICY STATEMENT

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively.
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany

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