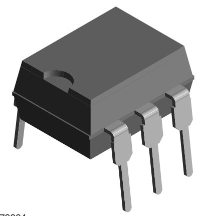
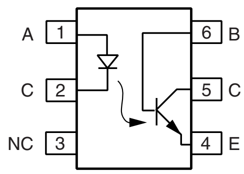
Optocoupler, Phototransistor Output, with Base Connection





FEATURES

- Isolation test voltage 5300 V_{RMS}
- 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

AGENCY APPROVALS

- Underwriters lab file no. E52744 system code H or J
- DIN EN 60747-5-5
- BSI IEC 60950, IEC 60065
- FIMKO

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.

ORDER INFORMATION

PART	REMARKS
CNY17-1	CTR 40 to 80 %, DIP-6
CNY17-2	CTR 63 to 125 %, DIP-6
CNY17-3	CTR 100 to 200 %, DIP-6
CNY17-4	CTR 160 to 320 %, DIP-6
CNY17-1X006	CTR 40 to 80 %, DIP-6 400 mil (option 6)
CNY17-1X007	CTR 40 to 80 %, SMD-6 (option 7)
CNY17-1X009	CTR 40 to 80 %, SMD-6 (option 9)
CNY17-2X006	CTR 63 to 125 %, DIP-6 400 mil (option 6)
CNY17-2X007	CTR 63 to 125 %, SMD-6 (option 7)
CNY17-2X009	CTR 63 to 125 %, SMD-6 (option 9)
CNY17-3X006	CTR 100 to 200 %, DIP-6 400 mil (option 6)
CNY17-3X007	CTR 100 to 200 %, SMD-6 (option 7)
CNY17-3X009	CTR 100 to 200 %, SMD-6 (option 9)
CNY17-4X006	CTR 160 to 320 %, DIP-6 400 mil (option 6)
CNY17-4X007	CTR 160 to 320 %, SMD-6 (option 7)
CNY17-4X009	CTR 160 to 320 %, SMD-6 (option 9)

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
Forward current		I_F	60	mA
Surge current	t ≤ 10 µs	I_{FSM}	2.5	A
Power dissipation		P_{diss}	100	mW

For technical questions, contact: optocoupler.answers@vishay.com

Document Number: 83606
Rev. 1.5, 09-Nov-05

ABSOLUTE MAXIMUM RATINGS

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
OUTPUT				
Collector emitter breakdown voltage		BV_{CEO}	70	V
Emitter base breakdown voltage		BV_{EBO}	7.0	V
Collector current		I_C	50	mA
	t < 1.0 ms	I_C	100	mA
Power dissipation		P_{diss}	150	mW
COUPLER				
Isolation test voltage between emitter and detector referred to climate DIN 50014, part 2, Nov. 74	t = 1.0 s	V_{ISO}	5300	V_{RMS}
Creepage distance			≥ 7.0	mm
Clearance distance			≥ 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, T_{amb} = 25 °C	R_{IO}	$\geq 10^{12}$	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	$\geq 10^{11}$	Ω
Storage temperature		T_{stg}	- 55 to + 150	°C
Operating temperature		T_{amb}	- 55 to + 100	°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 mA		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
Thermal resistance			R_{th}		750		K/W
OUTPUT							
Collector emitter capacitance	V_{CE} = 5.0 V, f = 1.0 MHz		C_{CE}		5.2		pF
Collector base capacitance	V_{CB} = 5.0 V, f = 1.0 MHz		C_{CB}		6.5		pF
Emitter base capacitance	V_{EB} = 5.0 V, f = 1.0 MHz		C_{EB}		7.5		pF
Thermal resistance			R_{th}		500		K/W
COUPLER							
Collector emitter, saturation voltage	V_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}		2.0	50	nA
		CNY17-2	I_{CEO}		2.0	50	nA
		CNY17-3	I_{CEO}		5.0	100	nA
		CNY17-4	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
I_C/I_F	V_{CE} = 5.0 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} = 5.0 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							
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	CNY17-1	t_{on}		3.0		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}		6.0		µs
Rise time	I_F = 20 mA	CNY17-1	t_r		2.0		µs
	I_F = 10 mA	CNY17-2	t_r		3.0		µs
		CNY17-3	t_r		3.0		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

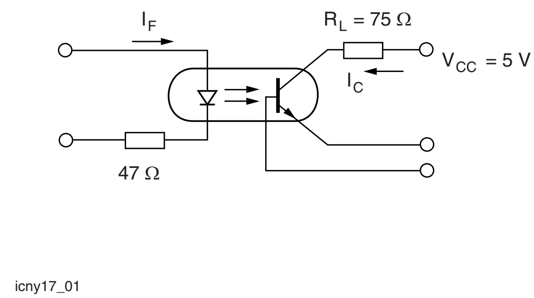


Fig. 1Linear Operation (without Saturation)

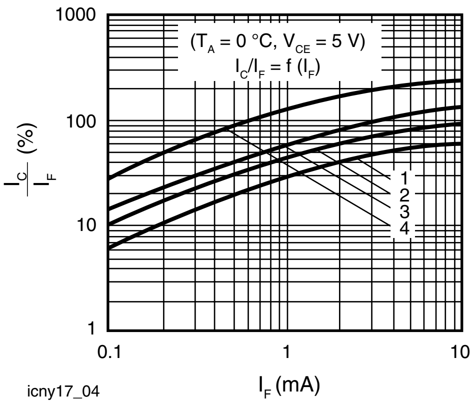


Fig. 4Current Transfer Ratio vs. Diode Current

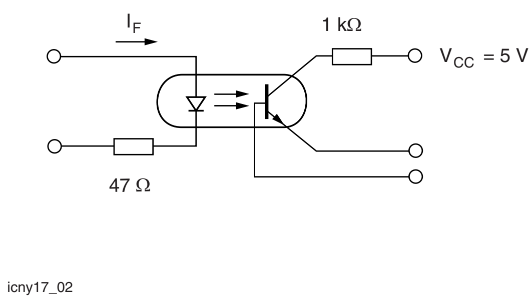


Fig. 2Switching Operation (with Saturation)

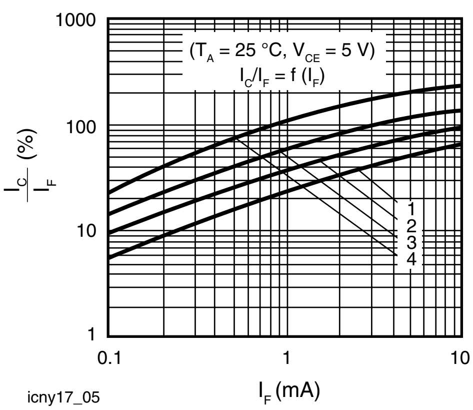


Fig. 5Current Transfer Ratio vs. Diode Current

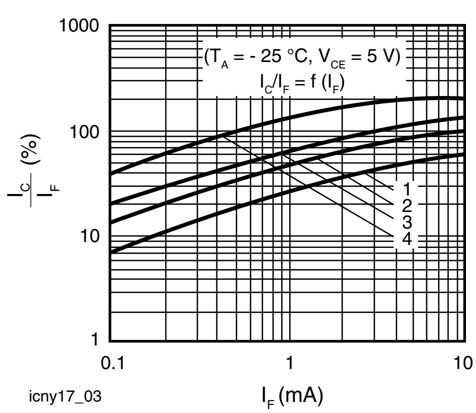


Fig. 3Current Transfer Ratio vs. Diode Current

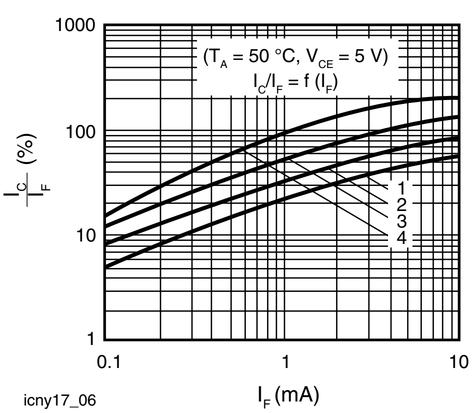


Fig. 6Current Transfer Ratio vs. Diode Current

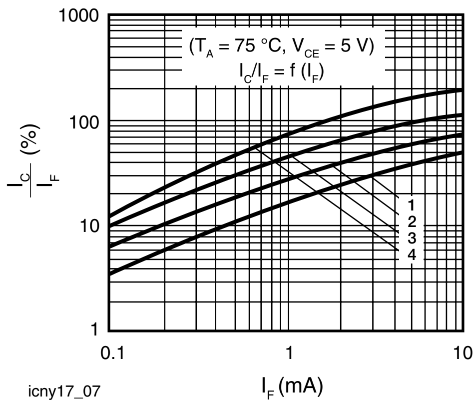


Fig. 7Current Transfer Ratio vs. Diode Current

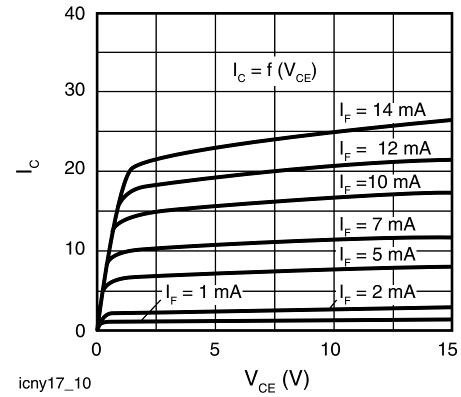


Fig. 10Output Characteristics

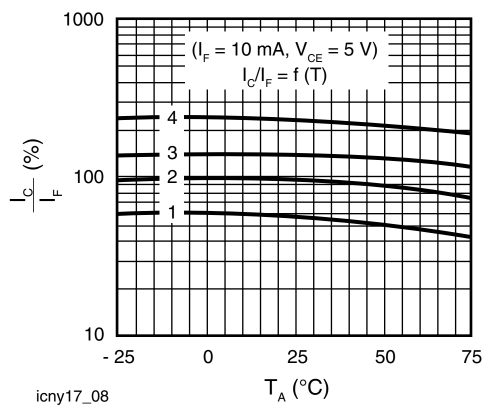


Fig. 8Current Transfer Ratio (CTR) vs. Temperature

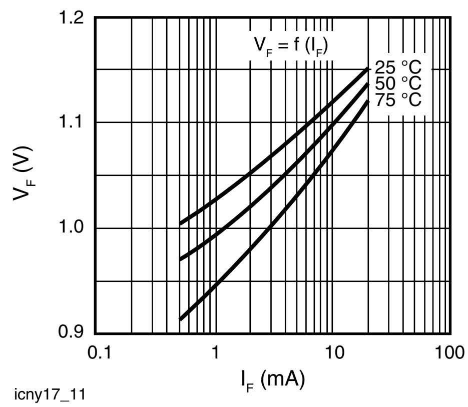


Fig. 11Forward Voltage

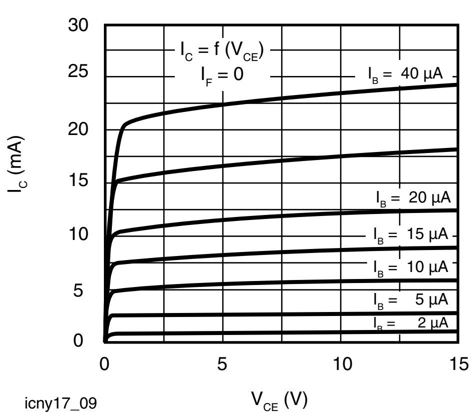


Fig. 9Transistor Characteristics

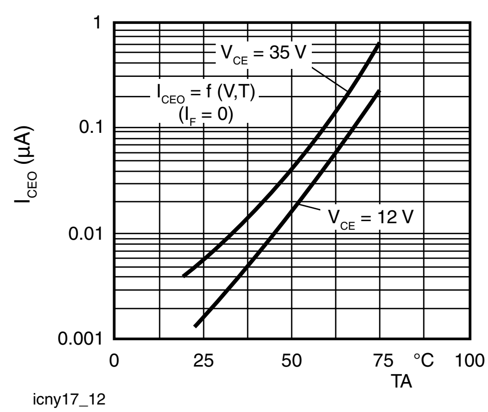


Fig. 12Collector Emitter Off-state Current

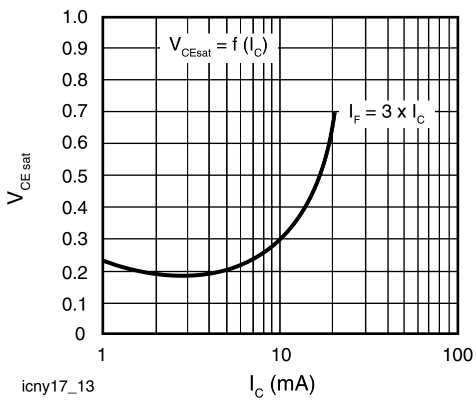


Fig. 13Saturation Voltage vs.
Collector Current and Modulation Depth CNY17-1

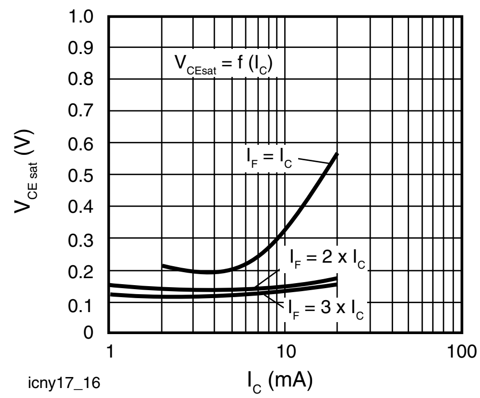


Fig. 16Saturation Voltage vs.
Collector Current and Modulation Depth CNY17-4

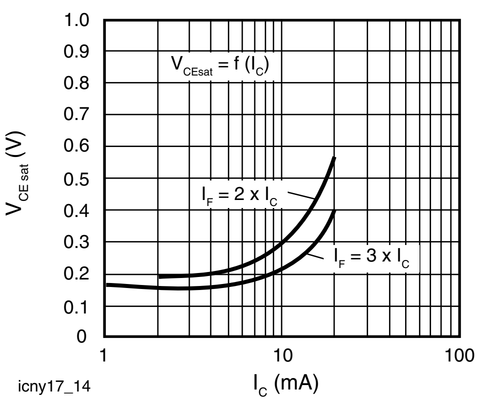


Fig. 14Saturation Voltage vs.
Collector Current and Modulation Depth CNY17-2

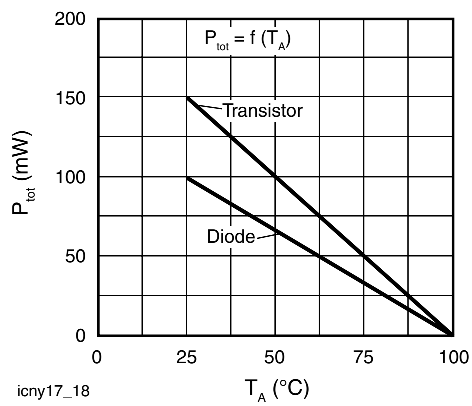


Fig. 17Permissible Power Dissipation for Transistor and Diode

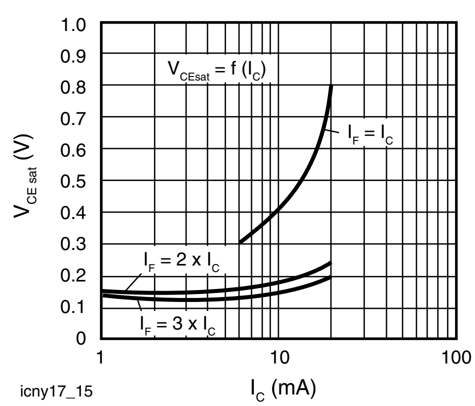
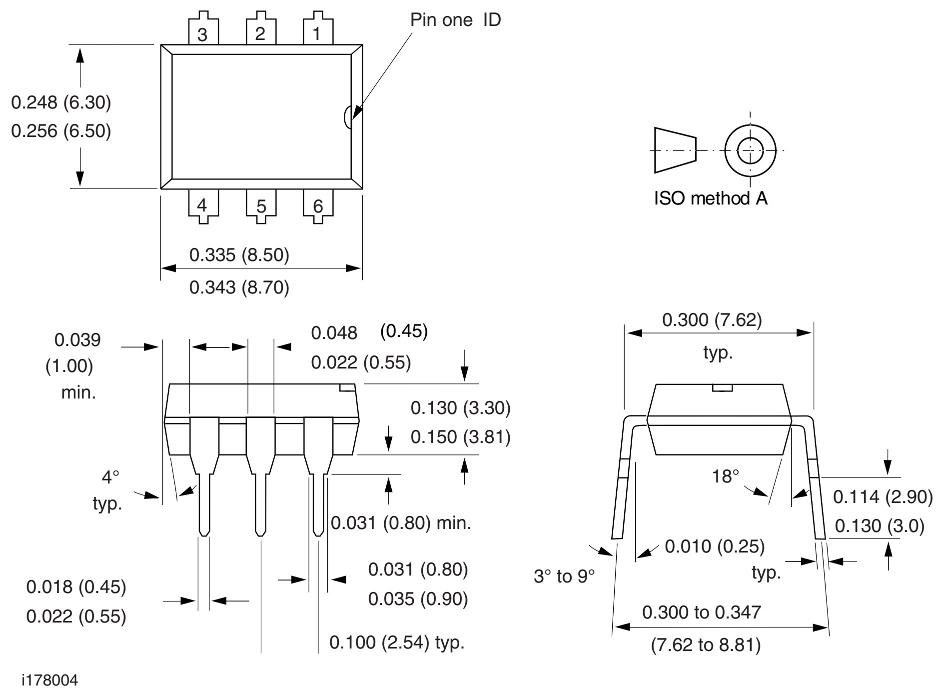
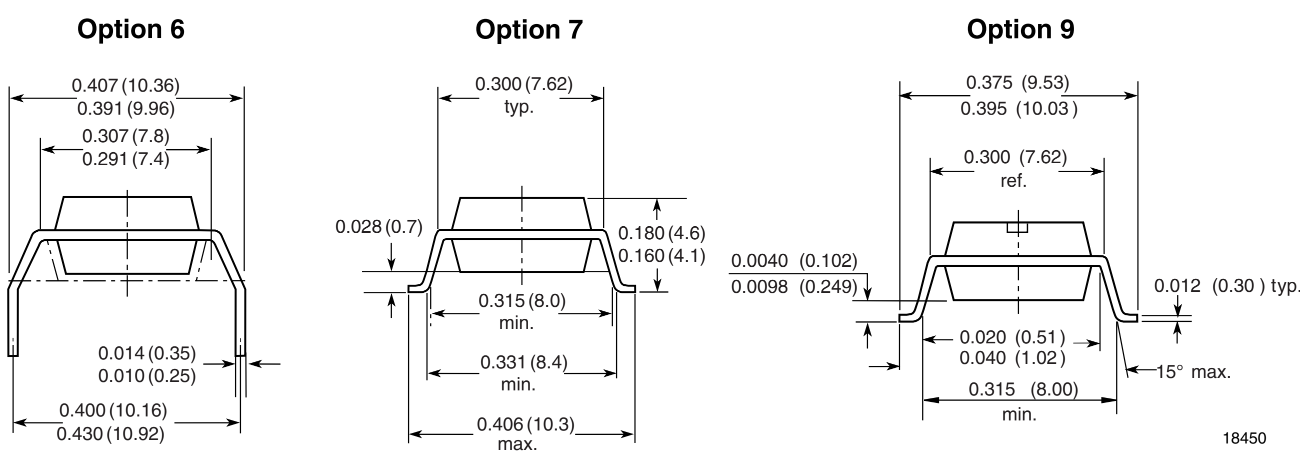


Fig. 15Saturation Voltage vs.
Collector Current and Modulation Depth CNY17-3

PACKAGE DIMENSIONS in inches (millimeters)





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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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