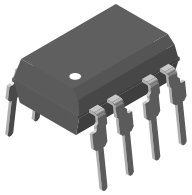
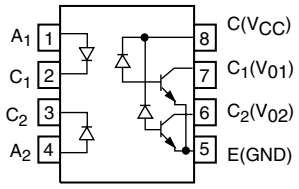
High Speed Optocoupler, Dual Channel, 1 MBd, Transistor Output





i179071

FEATURES

- Isolation test voltage, 5300 V_{RMS}
- TTL compatible
- Bit rates: 1.0 MBit/s
- High common mode transient immunity
- Bandwidth 2.0 MHz
- Open collector output
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

Pb-free

e3

RoHS COMPLIANT

DESCRIPTION

The SFH6325/SFH6326 are dual channel optocouplers with a GaAIAs infrared emitting diode, optically coupled with an integrated photo detector which consists of a photo diode and a high-speed transistor in a DIP-8 plastic package. Signals can be transmitted between two electrically separated circuits up to frequencies of 2.0 MHz. The potential difference between the circuits to be coupled should not exceed the maximum permissible reference voltages.

AGENCY APPROVALS

- UL1577, file no. E52744 system code H or J, double protection

ORDER INFORMATION

PART	REMARKS
SFH6325	CTR > 7.0 %, DIP-8
SFH6326	CTR > 19 %, DIP-8
SFH6325-X009	CTR > 7.0 %, SMD-8 (option 9)
SFH6326-X006	CTR > 19 %, DIP-8 400 mil (option 6)
SFH6326-X007	CTR > 19 %, SMD-8 (option 7)
SFH6326-X009	CTR > 19 %, SMD-8 (option 9)

Note

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

ABSOLUTE MAXIMUM RATINGS (1)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Reverse voltage		V_R	4.5	V
Forward continuous current		I_F	25	mA
Peak forward current	t = 1.0 ms, duty cycle 50 %	I_{FM}	50	mA
Maximum surge forward current	t ≤ 1.0 µs, 300 pulses/s	I_{FSM}	1.0	A
Derate linearly from 25 °C			0.6	mW/°C
Power dissipation	T_{amb} ≤ 70 °C	P_{diss}	50	mW
OUTPUT				
Supply voltage		V_S	- 0.5 to 30	V
Output voltage		V_O	- 0.5 to 25	V
Collector output current		I_{CO}	8.0	mA
Derate linearly from 25 °C			1.33	mW/°C
Power dissipation	T_{amb} ≤ 70 °C	P_{diss}	50	mW

ABSOLUTE MAXIMUM RATINGS (1)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
COUPLER				
Isolation test voltage	t = 1.0 s	V_{ISO}	5300	V_{RMS}
Pollution degree (DIN VDE 0109)			2	
Creepage distance			≥ 7	mm
Clearance distance			≥ 7	mm
Derate linearly from 25 °C			1.93	mW/°C
Total package dissipation		P_{tot}	145	mW
Comparative tracking index per DIN IEC112/VDE 0303 part 1, group IIIa per DIN VDE 6110			175	
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 range		T_{stg}	- 55 to + 125	°C
Ambient temperature range		T_{amb}	- 55 to +100	°C
Soldering temperature (2)	max. 10 s, dip soldering distance to seating plane ≥ 1.5 mm	T_{sld}	260	°C

Notes

(1) 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.

(2) Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

ELECTRICAL CHARACTERISTICS (1)

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT (2)							
Forward voltage	I_F = 16 mA		V_F		1.6	1.9	V
Breakdown voltage	I_R = 10 µs		V_{BR}	4.5			V
Reverse current	V_R = 4.5 V		I_R		0.5	10	µA
Capacitance	V_R = 0 V, f = 1.0 MHz		C_O		125		pF
Temperature coefficient of forward voltage	I_F = 16 mA		$\Delta V_F/\Delta T_{amb}$		- 1.7		mV/°C
OUTPUT							
Logic low supply current	I_F = 16 mA, V_O = open, V_{CC} = 4.5 V		I_{CCL}		100	200	µA
Supply current, logic high	I_F = 0 mA, V_O = open, V_{CC} = 15 V		I_{CCH}		0.01	4.0	µA
Logic low output voltage	I_F = 16 mA, V_{CC} = 4.5 V, I_O = 1.1 mA	SFH6325	V_{OL}		0.1	0.5	V
	I_F = 16 mA, V_{CC} = 4.5 V, I_O = 3.0 mA	SFH6326	V_{OL}		0.1	0.5	V
Logic high output current	I_F = 0 mA, V_O = V_{CC} = 5.5 V		I_{OH}		3.0	500	nA
	I_F = 0 mA, V_O = V_{CC} = 15 V		I_{OH}			50	µA
Channel to channel (3) crosstalk	I_F = 16 mA, V_O = V_{CC} = 5.5 V		I_{OH-XT}			500	nA
COUPLER							
Capacitance (input to output)	f = 1.0 MHz		C_{IO}		0.6		pF

Notes

(1) T_{amb} = 25 °C, unless otherwise specified.
Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.

(2) T_{amb} = 0 °Cto 70 °C, unless otherwise specified.

(3) To measure crosstalk, turn on the LED for channel 1 and the output current for channel 2 in logic high. Repeat for channel 2.

CURRENT TRANSFER RATIO							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Current transfer ratio	I_F = 16 mA, V_{CC} = 4.5 V, V_O = 0.4 V	SFH6325	CTR	5	16		%
		SFH6326	CTR	19	35		%
	I_F = 16 mA, V_{CC} = 4.5 V, V_O = 0.5 V	SFH6325	CTR	5			%
		SFH6326	CTR	15			%

SWITCHING CHARACTERISTICS							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
High to low	I_F = 16 mA, V_{CC} = 5.0 V, R_L = 4.1 kΩ	SFH6325	t_{PHL}		0.3	1.5	µs
	I_F = 16 mA, V_{CC} = 5.0 V, R_L = 1.9 kΩ	SFH6326	t_{PHL}		0.2	0.8	µs
Low to high	I_F = 16 mA, V_{CC} = 5.0 V, R_L = 4.1 kΩ	SFH6325	t_{PLH}		0.6	1.5	µs
	I_F = 16 mA, V_{CC} = 5.0 V, R_L = 1.9 kΩ	SFH6326	t_{PLH}		0.5	0.8	µs

COMMON MODE TRANSIENT IMMUNITY							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
CMTI at logic high level output	I_F = 0 mA, C_{CM} = 10 V_{P-P}, V_{CC} = 5.0 V, R_L = 4.1 kΩ	SFH6325	CM_H		1000		V/µs
	I_F = 0 mA, C_{CM} = 10 V_{P-P}, V_{CC} = 5.0 V, R_L = 1.9 kΩ	SFH6326	CM_H		1000		V/µs
CMTI at logic low level output	I_F = 16 mA, C_{CM} = 10 V_{P-P}, V_{CC} = 5.0 V, R_L = 4.1 kΩ	SFH6325	CM_L		1000		V/µs
	I_F = 16 mA, C_{CM} = 10 V_{P-P}, V_{CC} = 5.0 V, R_L = 1.9 kΩ	SFH6326	CM_L		1000		V/µs

TYPICAL CHARACTERISTICS

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

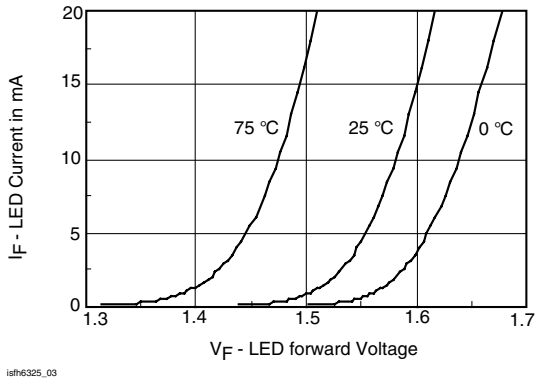


Fig. 1 - LED Forward Current vs. Forward Voltage

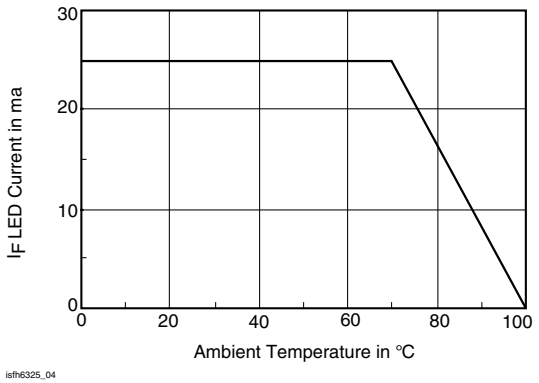


Fig. 2 - Permissible Forward LED Current vs. Temperature

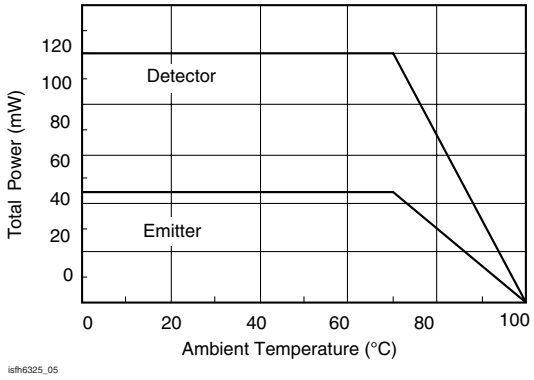


Fig. 3 - Permissible Power Dissipation vs. Temperature

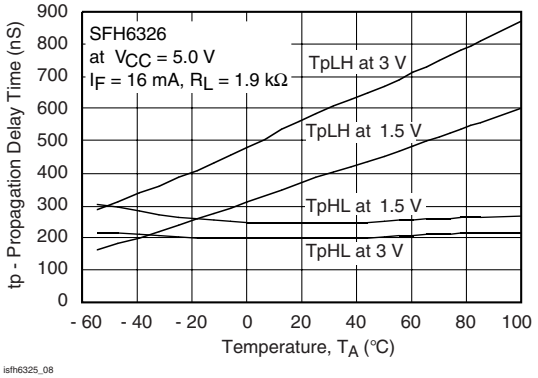


Fig. 6 - Propagation Delay vs. Ambient Temperature

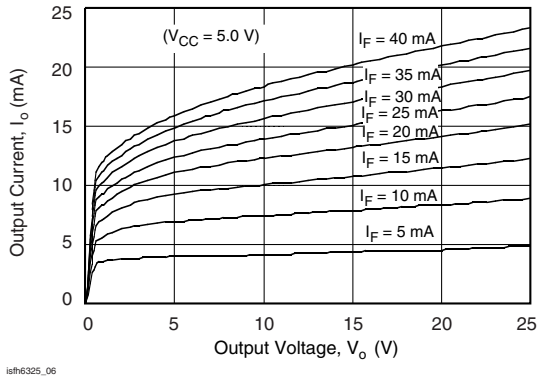


Fig. 4 - Output Current vs. Output Voltage

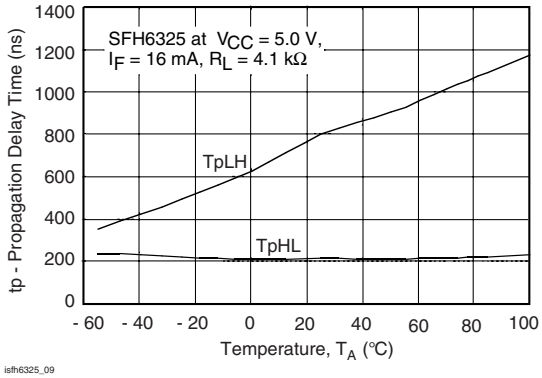


Fig. 7 - Propagation Delay vs. Ambient Temperature

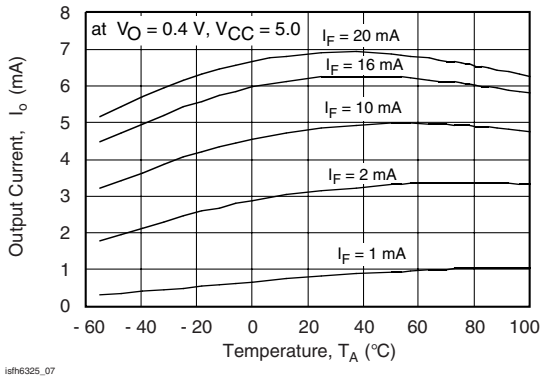


Fig. 5 - Output Current vs. Temperature

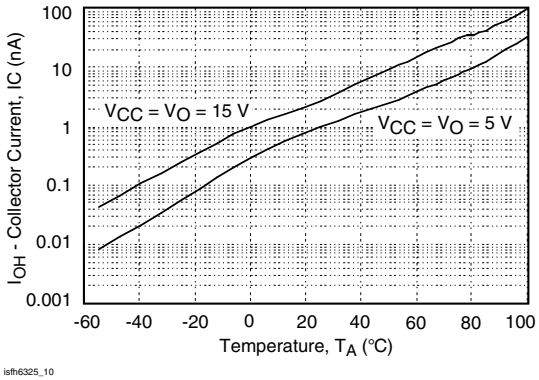


Fig. 8 - Logic High Output Current vs. Temperature

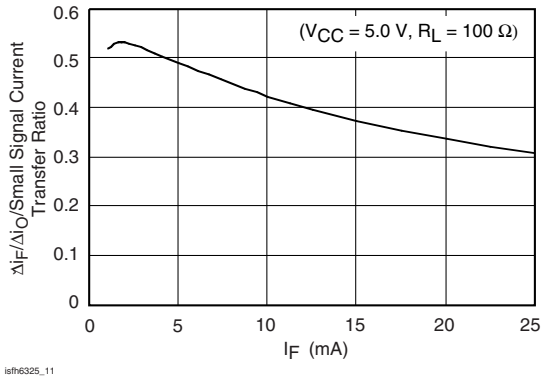


Fig. 9 - Small Signal Current Transfer Ratio vs. Input Current

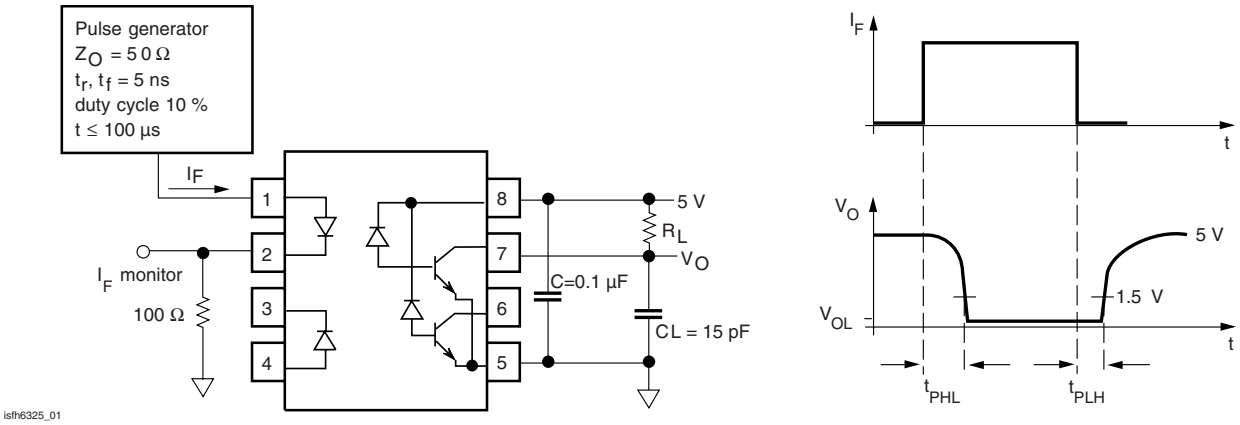


Fig. 10 - Switching Time and Test Circuit

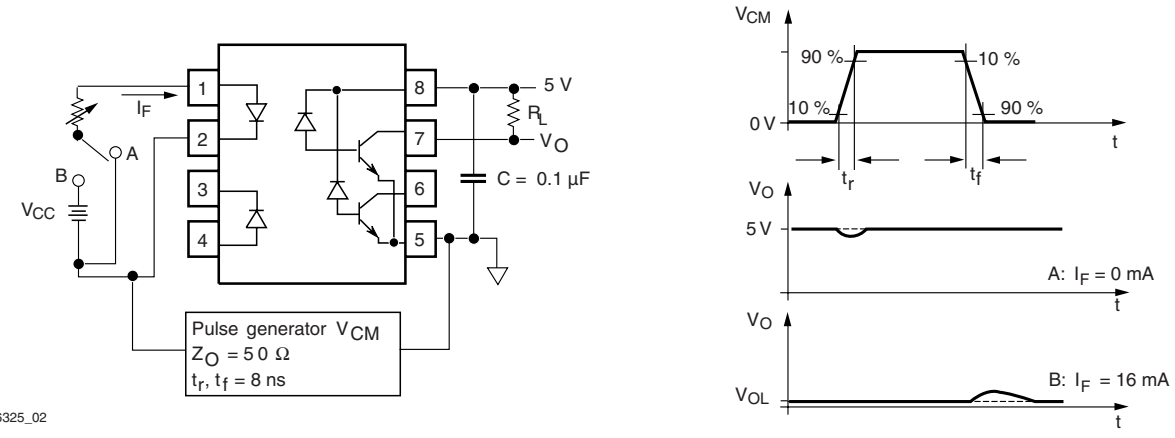
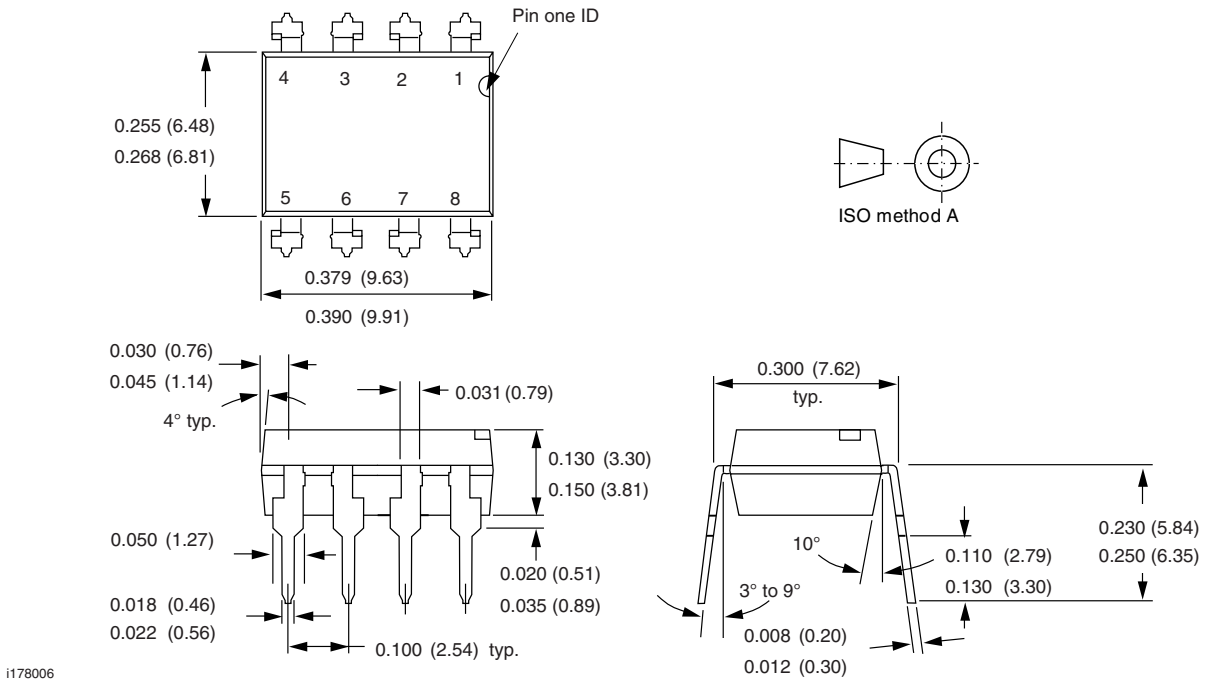
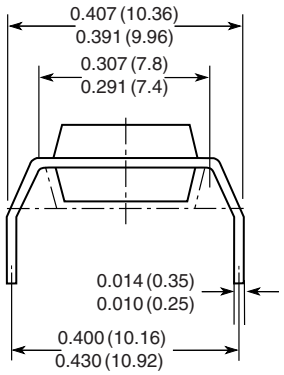


Fig. 11 - Waveform and Test Circuit for Common Mode Transient Immunity

PACKAGE DIMENSIONS in inches (millimeters)



Option 6



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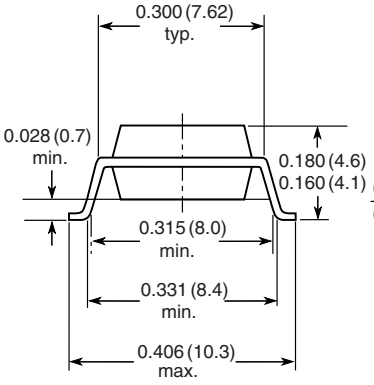
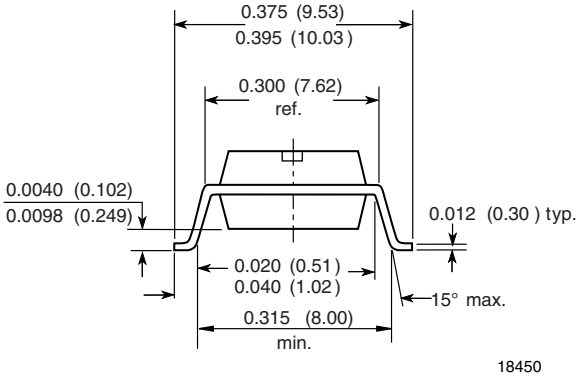


Option 9



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.

We reserve the right to make changes to improve technical design
and may do so without further notice.
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Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany

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