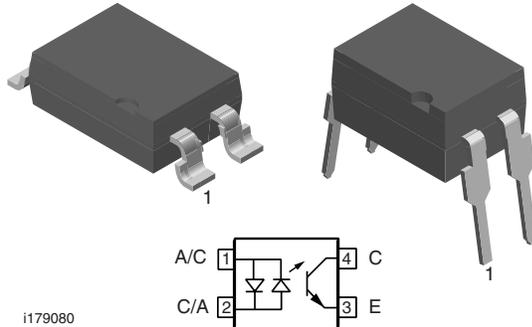


Optocoupler, Phototransistor Output, AC Input, Low Input Current



i179080

DESCRIPTION

The SFH628A (DIP) and SFH6286 (SMD) feature a high current transfer ratio, low coupling capacitance and high isolation voltage. These couplers have a GaAs infrared emitting diode, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a plastic DIP-4 or SMD package.

The coupling devices are designed for signal transmission between two electrically separated circuits.

The couplers are end-stackable with 2.54 mm lead spacing. Creepage and clearance distances of > 8.0 mm are achieved with option 6. This version complies with IEC 60950 (DIN VDE 0805) for reinforced insulation to an operation voltage of 400 V_{RMS} or DC.

FEATURES

- High common mode interference immunity
- Isolation test voltage, 5300 V_{RMS}
- Low coupling capacitance
- Good CTR linearity depending on forward current
- Low CTR degradation
- High collector emitter voltage, V_{CEO} = 55 V
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC


RoHS
COMPLIANT

APPLICATIONS

- Telecom
- Industrial controls
- Battery powered equipment
- Office machines

AGENCY APPROVALS

- UL1577, file no. E52744 system code J
- DIN EN 60747-5-5 (VDE 0884) available with option 1
- BSI IEC 60950; IEC 60065

ORDER INFORMATION

| PART | REMARKS |
|---------------|--|
| SFH628A-2 | CTR 63 % to 200 %, DIP-4 |
| SFH628A-3 | CTR 100 % to 320 %, DIP-4 |
| SFH628A-4 | CTR 160 % to 500 %, DIP-4 |
| SFH6286-2 | CTR 63 % to 200 %, SMD-4 |
| SFH6286-3 | CTR 100 % to 320 %, SMD-4 |
| SFH6286-4 | CTR 160 % to 500 %, SMD-4 |
| SFH628A-2X006 | CTR 63 % to 200 %, DIP-4 400 mil (option 6) |
| SFH628A-3X006 | CTR 100 % to 320 %, DIP-4 400 mil (option 6) |
| SFH628A-3X007 | CTR 100 % to 320 %, SMD-4 (option 7) |
| SFH628A-4X006 | CTR 160 % to 500 %, DIP-4 400 mil (option 6) |

Note

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

ABSOLUTE MAXIMUM RATINGS ⁽¹⁾

| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
|-----------------------|----------------|-------------------|-------|------|
| INPUT | | | | |
| DC forward current | | I _F | ± 50 | mA |
| Surge forward current | t ≤ 10 μs | I _{FSM} | ± 2.5 | A |
| Power dissipation | | P _{diss} | 76 | mW |

| ABSOLUTE MAXIMUM RATINGS ⁽¹⁾ | | | | |
|---|--|------------|----------------|-----------|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| OUTPUT | | | | |
| Collector emitter voltage | | V_{CE} | 55 | V |
| Emitter collector voltage | | V_{EC} | 7 | V |
| Collector current | | I_C | 50 | mA |
| | $t_p \leq 1.0$ ms | I_C | 100 | mA |
| Power dissipation | | P_{diss} | 150 | mW |
| COUPLER | | | | |
| Isolation test voltage between emitter and detector | | V_{ISO} | 5300 | V_{RMS} |
| Creepage distance | | | ≥ 7 | mm |
| Clearance distance | | | ≥ 7 | mm |
| Insulation thickness between emitter and detector | | | ≥ 0.4 | mm |
| Comparative tracking index per DIN IEC112/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 range | | T_{stg} | - 55 to + 150 | °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_{slid} | 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 | | | | | | | |
|--------------------------------------|-----------------------------------|-----------|-------------|------|------|------|------|
| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| INPUT | | | | | | | |
| Forward voltage | $I_F = 5$ mA | | V_F | | 1.1 | 1.5 | V |
| Capacitance | $V_R = 0$ V, $f = 1$ MHz | | C_O | | 45 | | pF |
| Thermal resistance | | | R_{thja} | | 1070 | | K/W |
| OUTPUT | | | | | | | |
| Collector emitter leakage current | $V_{CE} = 10$ V | | I_{CEO} | | 10 | 200 | nA |
| Collector emitter capacitance | $V_{CE} = 5$ V, $f = 1$ MHz | | C_{CE} | | 7 | | pF |
| Thermal resistance | | | R_{thja} | | 500 | | K/W |
| COUPLER | | | | | | | |
| Collector emitter saturation voltage | $I_F = \pm 1$ mA, $I_C = 0.5$ mA | SFH628A-2 | V_{CEsat} | | 0.25 | 0.4 | V |
| | | SFH6286-2 | V_{CEsat} | | 0.25 | 0.4 | V |
| | $I_F = \pm 1$ mA, $I_C = 0.8$ mA | SFH628A-3 | V_{CEsat} | | 0.25 | 0.4 | V |
| | | SFH6286-3 | V_{CEsat} | | 0.25 | 0.4 | V |
| | $I_F = \pm 1$ mA, $I_C = 1.25$ mA | SFH628A-4 | V_{CEsat} | | 0.25 | 0.4 | V |
| | | SFH6286-4 | V_{CEsat} | | 0.25 | 0.4 | V |

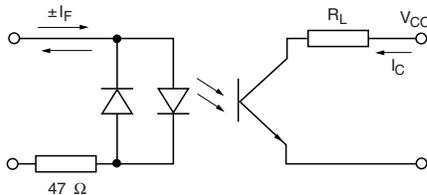
Note

$T_{amb} = 25$ °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.

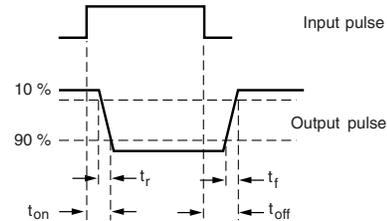
| CURRENT TRANSFER RATIO | | | | | | | |
|------------------------|--|-----------|--------|------|------|------|------|
| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| I_C/I_F | $I_F = \pm 1.0 \text{ mA}, V_{CE} = 0.5 \text{ V}$ | SFH628A-2 | CTR | 63 | | 200 | % |
| | | SFH6286-2 | CTR | 63 | | 200 | % |
| | $I_F = \pm 0.5 \text{ mA}, V_{CE} = 1.5 \text{ V}$ | SFH628A-2 | CTR | 32 | 100 | | % |
| | | SFH6286-2 | CTR | 32 | 100 | | % |
| | $I_F = \pm 1 \text{ mA}, V_{CE} = 0.5 \text{ V}$ | SFH628A-3 | CTR | 100 | | 320 | % |
| | | SFH6286-3 | CTR | 100 | | 320 | % |
| | $I_F = \pm 0.5 \text{ mA}, V_{CE} = 1.5 \text{ V}$ | SFH628A-3 | CTR | 50 | 160 | | % |
| | | SFH6286-3 | CTR | 50 | 160 | | % |
| | $I_F = \pm 1 \text{ mA}, V_{CE} = 0.5 \text{ V}$ | SFH628A-4 | CTR | 160 | | 500 | % |
| | | SFH6286-4 | CTR | 160 | | 500 | % |
| | $I_F = \pm 0.5 \text{ mA}, V_{CE} = 1.5 \text{ V}$ | SFH628A-4 | CTR | 80 | 250 | | % |
| | | SFH6286-4 | CTR | 80 | 250 | | % |

| SWITCHING CHARACTERISTICS | | | | | | |
|---------------------------|--|-----------|------|------|------|---------------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Turn-on time | $V_{CC} = 5 \text{ V}, I_C = 2 \text{ mA}, R_L = 100 \Omega$ | t_{on} | | | 6 | μs |
| Rise time | $V_{CC} = 5 \text{ V}, I_C = 2 \text{ mA}, R_L = 100 \Omega$ | t_r | | | 3.5 | μs |
| Turn-off time | $V_{CC} = 5 \text{ V}, I_C = 2 \text{ mA}, R_L = 100 \Omega$ | t_{off} | | | 5.5 | μs |
| Fall time | $V_{CC} = 5 \text{ V}, I_C = 2 \text{ mA}, R_L = 100 \Omega$ | t_f | | | 5 | μs |



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Fig. 1 - Test Circuit



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Fig. 2 - Test Circuit and Waveforms

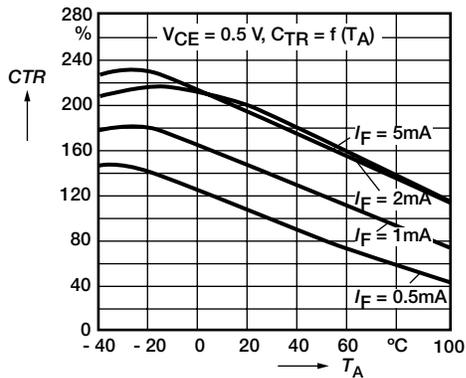
| SAFETY AND INSULATION RATINGS | | | | | | |
|--|------------------------|--------|-------|-----------|------|--------------------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Climatic classification (according to IEC 68 part 1) | | | | 55/100/21 | | |
| Comparative tracking index | | CTI | 175 | | 399 | |
| V_{IOTM} | | | 10000 | | | V |
| V_{IORM} | | | 890 | | | V |
| P_{SO} | | | | | 400 | mW |
| I_{SI} | | | | | 275 | mA |
| T_{SI} | | | | | 175 | $^{\circ}\text{C}$ |
| Creepage distance | standard DIP-8 | | 7 | | | mm |
| Clearance distance | standard DIP-8 | | 7 | | | mm |
| Creepage distance | 400 mil DIP-8 | | 8 | | | mm |
| Clearance distance | 400 mil DIP-8 | | 8 | | | mm |
| Insulation thickness, reinforced rated | per IEC 60950 2.10.5.1 | | 0.4 | | | mm |

Note

As per IEC 60747-5-2, § 7.4.3.8.1, this optocoupler is suitable for "safe electrical insulation" only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

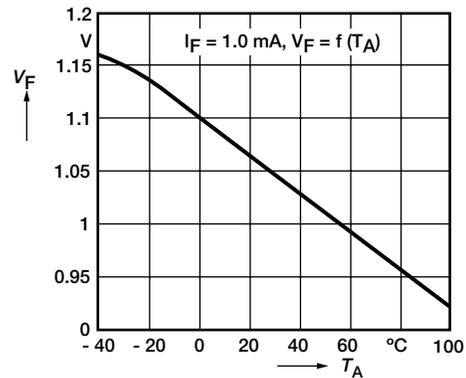
TYPICAL CHARACTERISTICS

$T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified



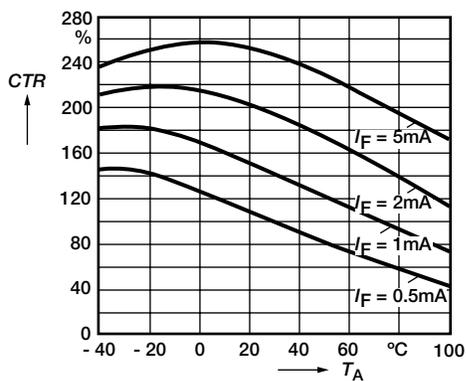
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Fig. 3 - Current Transfer Ratio (typ.)



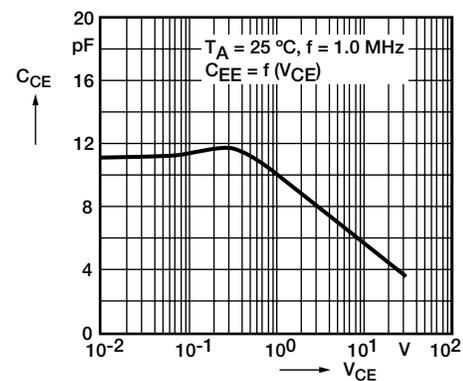
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Fig. 6 - Diode Forward Voltage (typ.)



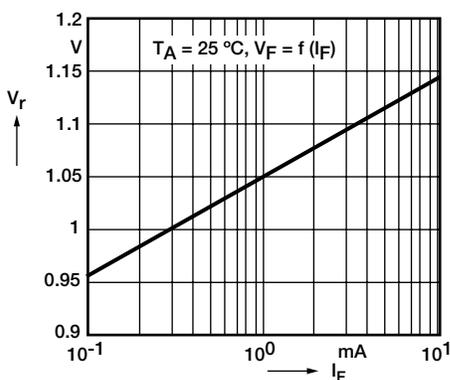
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Fig. 4 - Current Transfer Ratio (typ.)



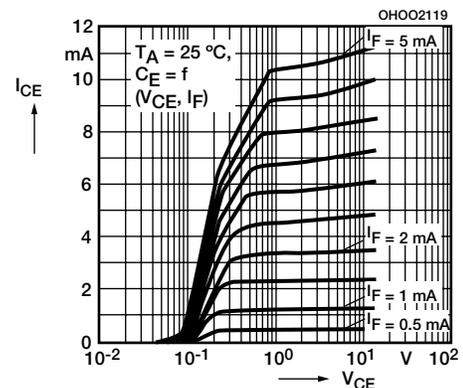
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Fig. 7 - Transistor Capacitance



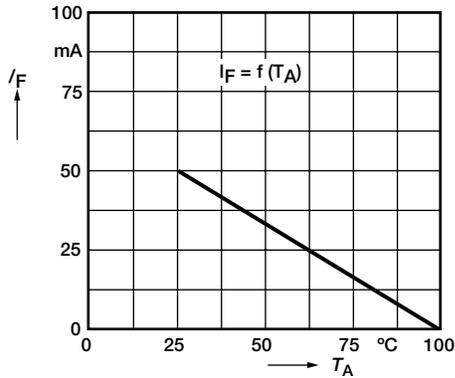
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Fig. 5 - Diode Forward Voltage (typ.)



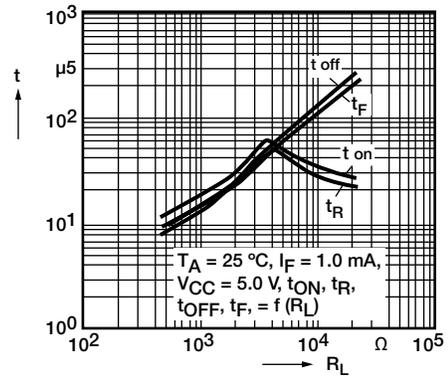
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Fig. 8 - Output Characteristics



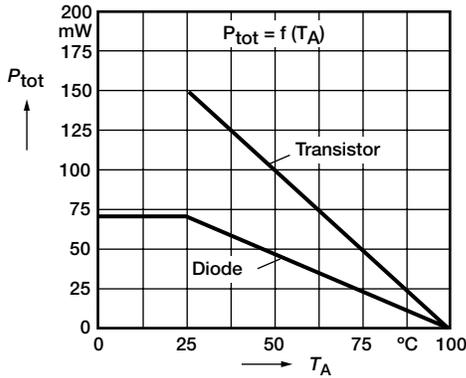
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Fig. 9 - Permissible Forward Current Diode



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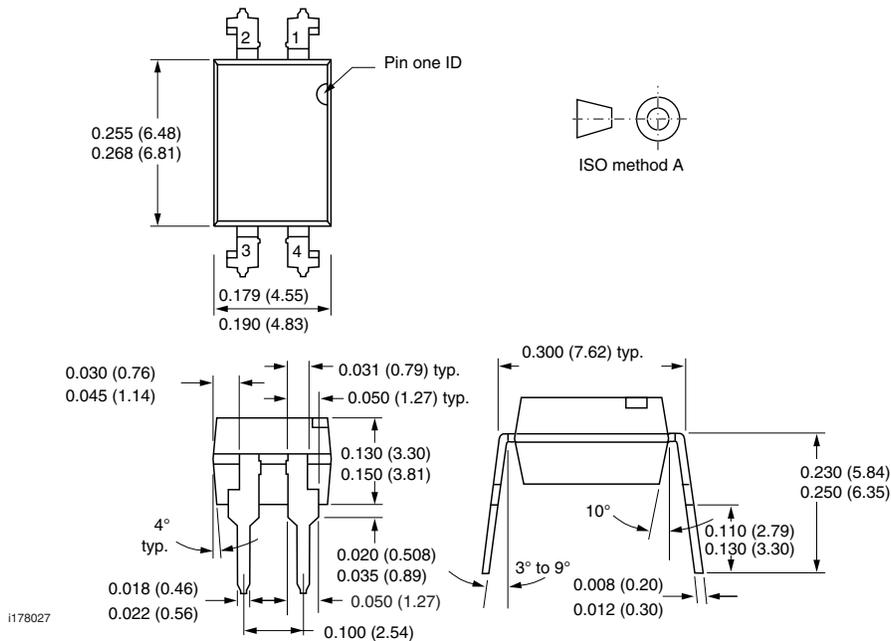
Fig. 11 - Switching Times (Typ.)



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Fig. 10 - Permissible Power Dissipation

PACKAGE DIMENSIONS in inches (millimeters)



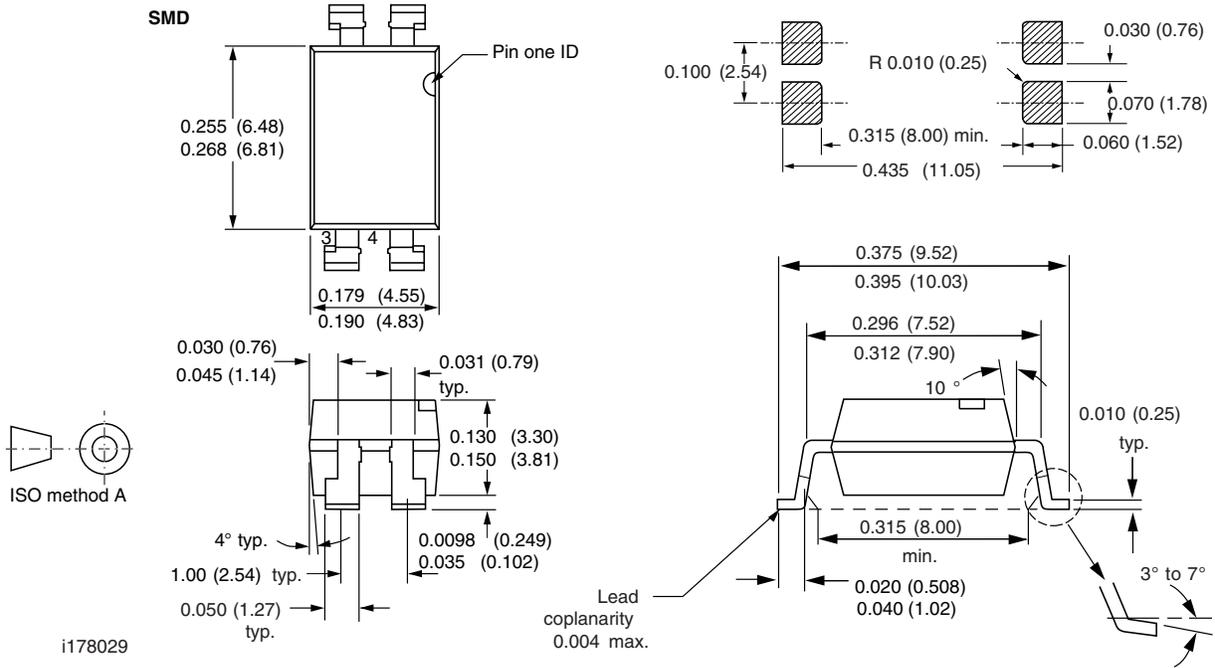
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SFH628A, SFH6286

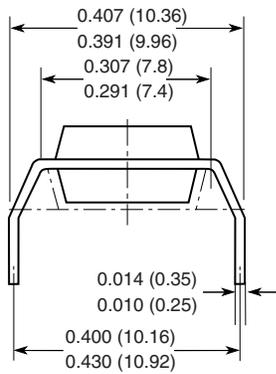


Vishay Semiconductors

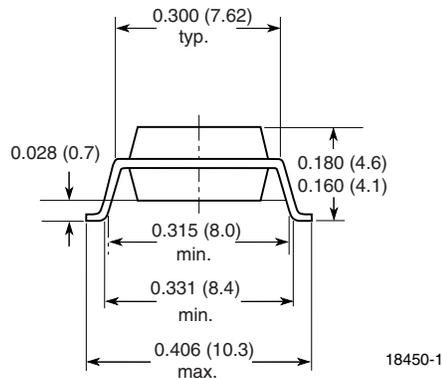
Optocoupler, Phototransistor Output,
AC Input, Low Input Current



Option 6



Option 7



**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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