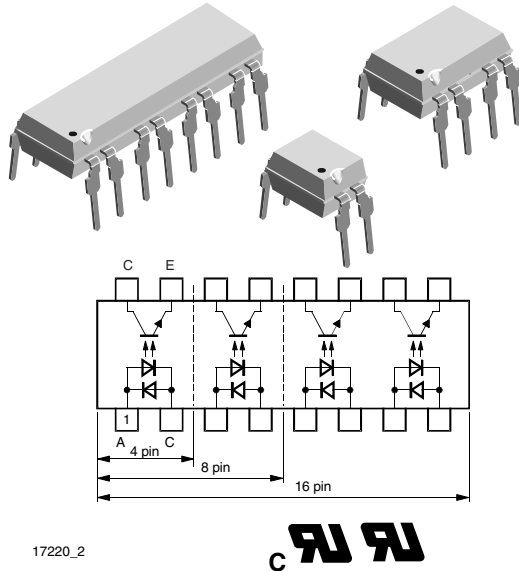


## Optocoupler, Phototransistor Output, AC Input



17220\_2



### DESCRIPTION

The K814P, K824P, K844P consist of a phototransistor optically coupled to 2 gallium arsenide infrared emitting diodes (reverse polarity) in 4 pin (single); 8 pin (dual) or 16-pin (quad) plastic dual inline package. The elements are mounted on one leadframe providing a fixed distance between input and output for highest safety requirements.

### FEATURES

- Endstackable to 2.54 mm (0.1") spacing
- DC isolation test voltage  $V_{ISO} = 5000 V_{RMS}$
- Low coupling capacitance of typical 0.3 pF
- Current transfer ratio (CTR) of typical 100 %
- Low temperature coefficient of CTR
- Wide ambient temperature range
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC



**RoHS**  
COMPLIANT

### APPLICATIONS

- Feature phones
- Answering machines
- PBX
- Fax machines

### AGENCY APPROVALS

- UL1577, file no. E76222 system code U, double protection
- C-UL CSA 22.2, bulletin 5A

| ORDER INFORMATION |                                   |
|-------------------|-----------------------------------|
| PART              | REMARKS                           |
| K814P             | CTR > 20 %, single channel, DIP-4 |
| K824P             | CTR > 20 %, dual channel, DIP-8   |
| K844P             | CTR > 20 %, quad channel, DIP-16  |

| ABSOLUTE MAXIMUM RATINGS <sup>(1)</sup> |                               |            |       |      |
|---|-------------------------------|------------|-------|------|
| PARAMETER                               | TEST CONDITION                | SYMBOL     | VALUE | UNIT |
| <b>INPUT</b>                            |                               |            |       |      |
| Forward current                         |                               | $I_F$      | ± 60  | mA   |
| Forward surge current                   | $t_p \leq 10 \mu s$           | $I_{FSM}$  | ± 1.5 | A    |
| Power dissipation                       |                               | $P_{diss}$ | 100   | mW   |
| Junction temperature                    |                               | $T_j$      | 125   | °C   |
| <b>OUTPUT</b>                           |                               |            |       |      |
| Collector emitter voltage               |                               | $V_{CEO}$  | 70    | V    |
| Emitter collector voltage               |                               | $V_{ECO}$  | 7     | V    |
| Collector current                       |                               | $I_C$      | 50    | mA   |
| Collector peak current                  | $t_p/T = 0.5, t_p \leq 10 ms$ | $I_{CM}$   | 100   | mA   |
| Power dissipation                       |                               | $P_{diss}$ | 150   | mW   |
| Junction temperature                    |                               | $T_j$      | 125   | °C   |

# K814P, K824P, K844P



Vishay Semiconductors Optocoupler, Phototransistor  
Output, AC Input

| ABSOLUTE MAXIMUM RATINGS (1)        |                          |                   |               |                  |
|-------------------------------------|--------------------------|-------------------|---------------|------------------|
| PARAMETER                           | TEST CONDITION           | SYMBOL            | VALUE         | UNIT             |
| <b>COUPLER</b>                      |                          |                   |               |                  |
| AC isolation test voltage (RMS)     | t = 1.0 min              | V <sub>ISO</sub>  | 5000          | V <sub>RMS</sub> |
| Total power dissipation             |                          | P <sub>tot</sub>  | 250           | mW               |
| Operating ambient temperature range |                          | T <sub>amb</sub>  | - 40 to +100  | °C               |
| Storage temperature range           |                          | T <sub>stg</sub>  | - 55 to + 125 | °C               |
| Soldering temperature (3)           | 2 mm from case, t ≤ 10 s | T <sub>slid</sub> | 260           | °C               |

## Notes

(1) T<sub>amb</sub> = 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 wave profile for soldering conditions for through hole devices.

| ELECTRICAL CHARACTERISTICS           |  |                    |      |      |      |      |
|--------------------------------------|--|--------------------|------|------|------|------|
| PARAMETER                            | TEST CONDITION   | SYMBOL             | MIN. | TYP. | MAX. | UNIT |
| <b>INPUT</b>                         |  |                    |      |      |      |      |
| Forward voltage                      | I <sub>F</sub> = ± 50 mA   | V <sub>F</sub>     |      | 1.25 | 1.6  | V    |
| Reverse current                      | V <sub>R</sub> = ± 6 V   | I <sub>R</sub>     |      |      | 10   | μA   |
| <b>OUTPUT</b>                        |  |                    |      |      |      |      |
| Collector emitter voltage            | I <sub>C</sub> = 100 μA  | V <sub>CEO</sub>   | 70   |      |      | V    |
| Emitter collector voltage            | I <sub>E</sub> = 100 μA  | V <sub>ECO</sub>   | 7    |      |      | V    |
| Collector dark current               | V <sub>CE</sub> = 20 V, I <sub>F</sub> = 0, E = 0                          | I <sub>CEO</sub>   |      |      | 100  | nA   |
| <b>COUPLER</b>                       |  |                    |      |      |      |      |
| Collector emitter saturation voltage | I <sub>F</sub> = ± 10 mA, I <sub>C</sub> = 1 mA                            | V <sub>CEsat</sub> |      |      | 0.3  | V    |
| Cut-off frequency                    | I <sub>F</sub> = ± 10 mA, V <sub>CE</sub> = 5 V,<br>R <sub>L</sub> = 100 Ω | f <sub>c</sub>     |      | 100  |      | kHz  |
| Coupling capacitance                 | f = 1 MHz  | C <sub>k</sub>     |      | 0.3  |      | pF   |

## Note

T<sub>amb</sub> = 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 <sub>C</sub> /I <sub>F</sub> | V <sub>CE</sub> = 5 V, I <sub>F</sub> = ± 5 mA | K814P | CTR    | 20   |      | 300  | %    |

| SWITCHING CHARACTERISTICS |  |                  |      |      |      |      |
|---------------------------|--|------------------|------|------|------|------|
| PARAMETER                 | TEST CONDITION   | SYMBOL           | MIN. | TYP. | MAX. | UNIT |
| Delay time                | V <sub>S</sub> = 5 V, I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 Ω (see figure 1) | t <sub>d</sub>   |      | 3    |      | μs   |
| Rise time                 | V <sub>S</sub> = 5 V, I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 Ω (see figure 1) | t <sub>r</sub>   |      | 3    |      | μs   |
| Fall time                 | V <sub>S</sub> = 5 V, I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 Ω (see figure 1) | t <sub>f</sub>   |      | 4.7  |      | μs   |
| Storage time              | V <sub>S</sub> = 5 V, I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 Ω (see figure 1) | t <sub>s</sub>   |      | 0.3  |      | μs   |
| Turn-on time              | V <sub>S</sub> = 5 V, I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 Ω (see figure 1) | t <sub>on</sub>  |      | 6    |      | μs   |
| Turn-off time             | V <sub>S</sub> = 5 V, I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 Ω (see figure 1) | t <sub>off</sub> |      | 5    |      | μs   |
| Turn-on time              | V <sub>S</sub> = 5 V, I <sub>C</sub> = 10 mA, R <sub>L</sub> = 1 kΩ (see figure 1) | t <sub>on</sub>  |      | 9    |      | μs   |
| Turn-off time             | V <sub>S</sub> = 5 V, I <sub>C</sub> = 10 mA, R <sub>L</sub> = 1 kΩ (see figure 1) | t <sub>off</sub> |      | 18   |      | μs   |

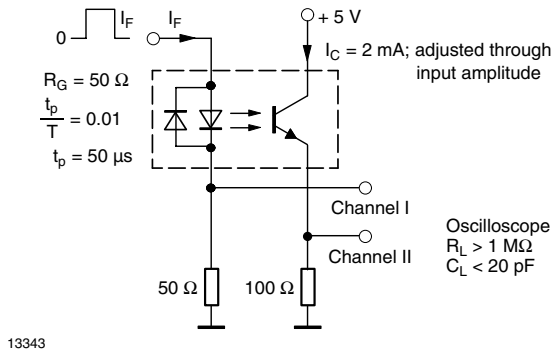


Fig. 1 - Test Circuit, Non-Saturated Operation

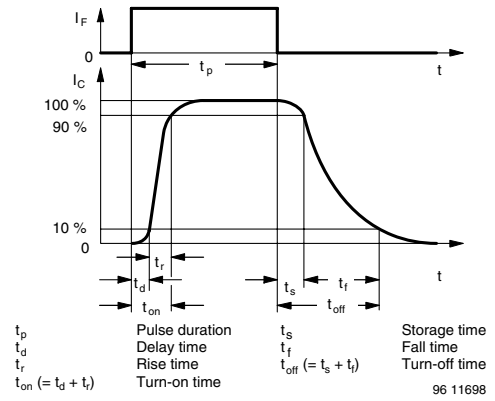


Fig. 3 - Switching Times

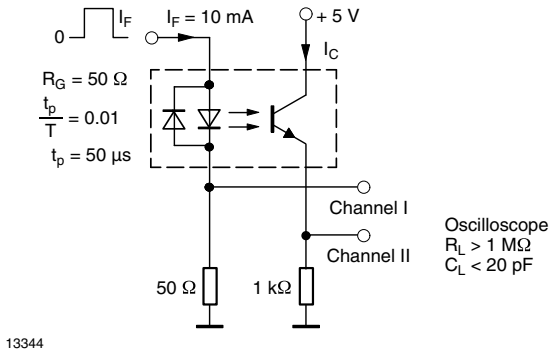


Fig. 2 - Test Circuit, Saturated Operation

## TYPICAL CHARACTERISTICS

T<sub>amb</sub> = 25 °C, unless otherwise specified

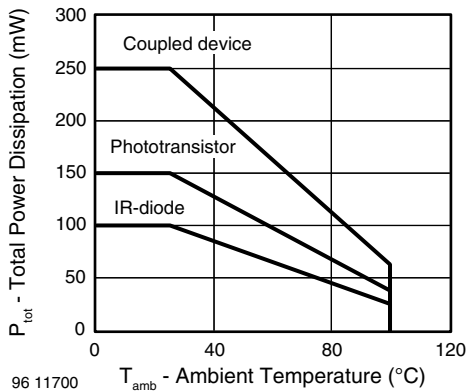


Fig. 4 - Total Power Dissipation vs. Ambient Temperature

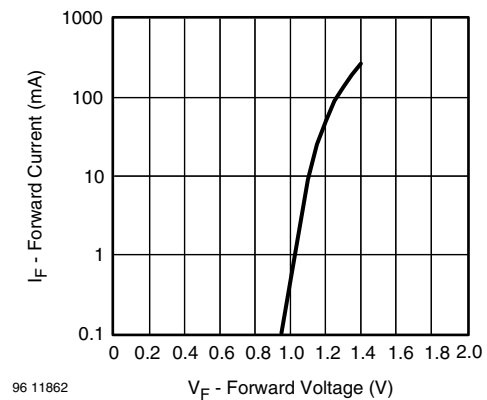


Fig. 5 - Forward Current vs. Forward Voltage

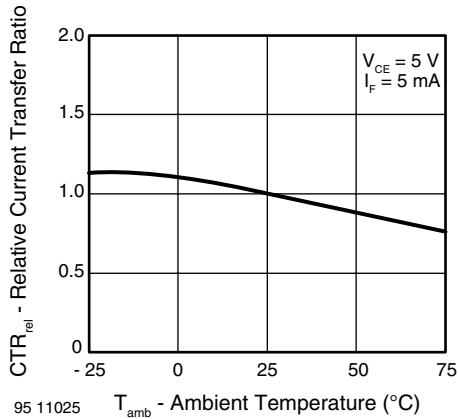


Fig. 6 - Relative Current Transfer Ratio vs. Ambient Temperature

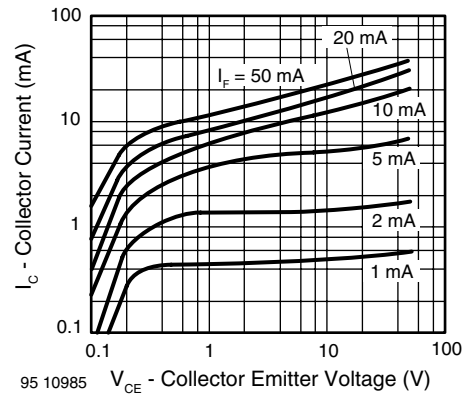


Fig. 9 - Collector Current vs. Collector Emitter Voltage

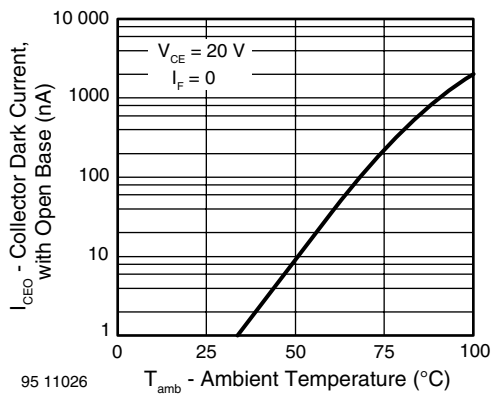


Fig. 7 - Collector Dark Current vs. Ambient Temperature

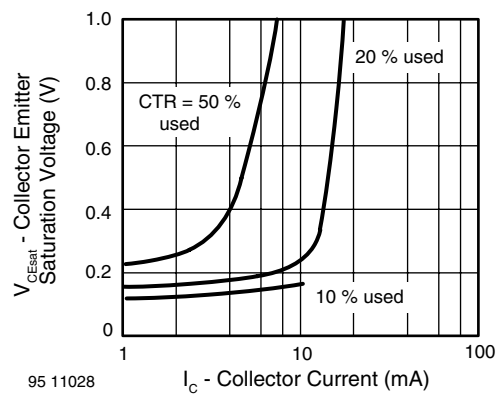


Fig. 10 - Collector Emitter Saturation Voltage vs. Collector Current

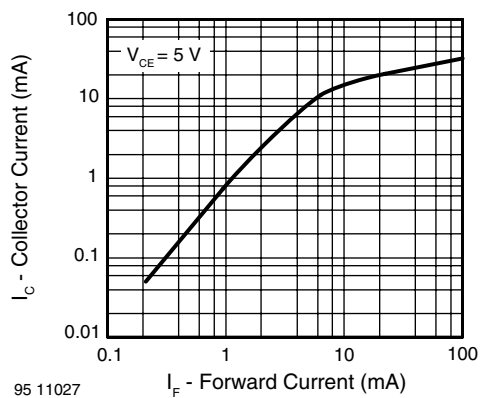


Fig. 8 - Collector Current vs. Forward Current

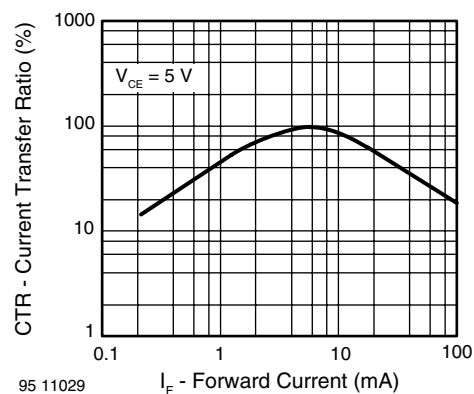


Fig. 11 - Current Transfer Ratio vs. Forward Current

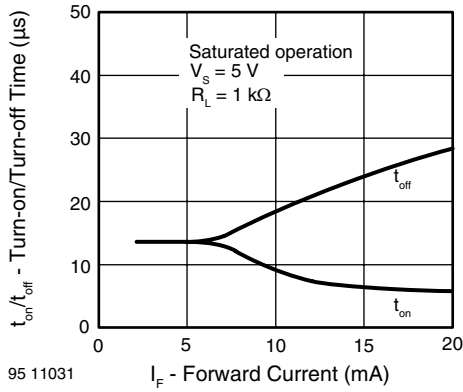


Fig. 12 - Turn-on/Turn-off Time vs. Forward Current

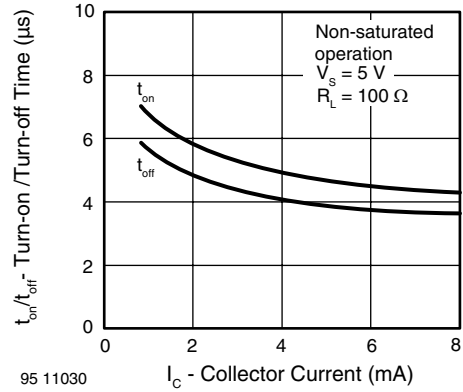
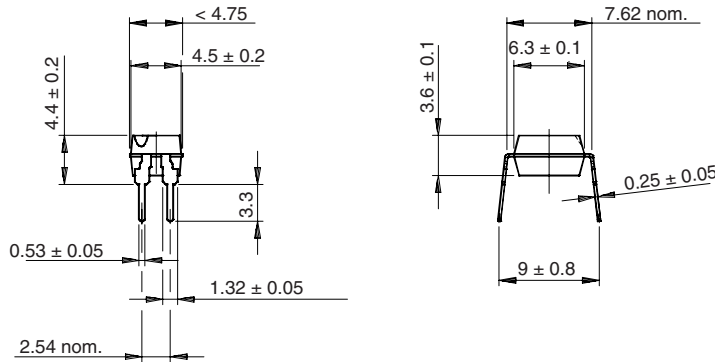


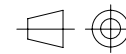
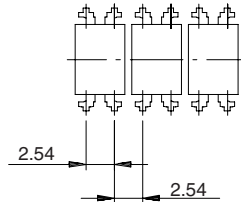
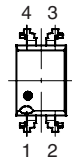
Fig. 13 - Turn-on/Turn-off Time vs. Collector Current

## PACKAGE DIMENSIONS in millimeters



E. g.:  
Special features: endstackable  
to 2.54 mm (0.100") spacing

Weight: ca. 0.25 g  
Creepage distance: > 6 mm  
Air path: > 6 mm  
after mounting on PC board



technical drawings  
according to DIN  
specifications

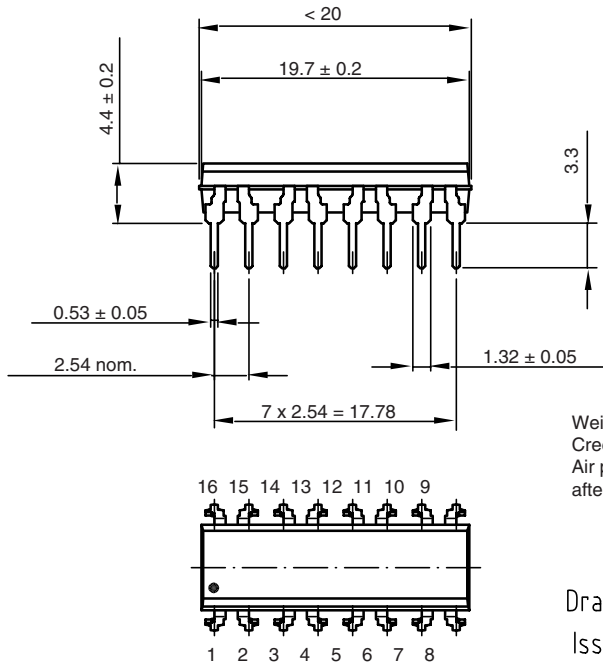
14789

Drawing-No.: 6.544-5302.03-4  
Issue: 5; 20.03.02

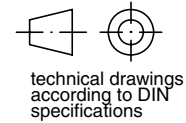
# K814P, K824P, K844P



Vishay Semiconductors Optocoupler, Phototransistor  
Output, AC Input

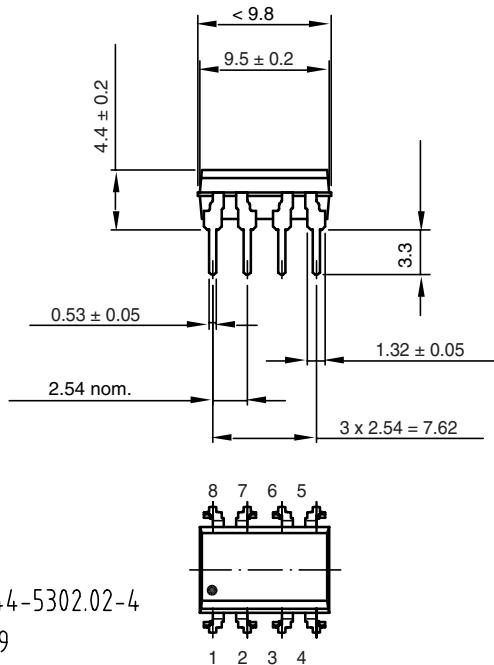


Weight: ca. 1.08 g  
Creepage distance: > 6 mm  
Air path: > 6 mm  
after mounting on PC board

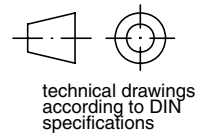


Drawing-No.: 6.544-5302.01-4  
Issue: 4; 02.06.99

14783



Weight: ca. 0.55 g  
Creepage distance: > 6 mm  
Air path: > 6 mm  
after mounting on PC board



Drawing-No.: 6.544-5302.02-4  
Issue: 4; 02.06.99

14784

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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.

We reserve the right to make changes to improve technical design  
and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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



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