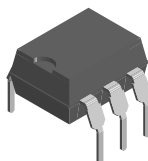
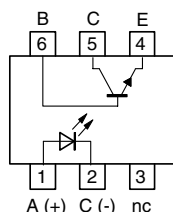


## Optocoupler, Phototransistor Output, with Base Connection



18537

### DESCRIPTION

The CNY17G consists of a phototransistor optically coupled to a gallium arsenide infrared-emitting diode in a 6 pin plastic dual inline package.

The elements are mounted on one leadframe providing a fixed distance between input and output for highest safety requirements.

### VDE STANDARDS

These couplers perform safety functions according to the following equipment standards:

- **DIN EN 60747-5-5**  
Optocoupler for electrical safety requirements
- **IEC EN 60950/EN 60950**  
Office machines (applied for reinforced isolation for mains voltage  $\leq 400 V_{RMS}$ )
- **VDE 0804**  
Telecommunication apparatus and data processing
- **IEC 60065**  
Safety for mains-operated electronic and related household apparatus

### AGENCY APPROVALS

- UL1577, file no. E76222 system code A, double protection
- BSI: BS EN 41003, BS EN 60065 (BS 415), BS EN 60950 (BS 7002), certificate number 7081 and 7402
- DIN EN 60747-5-5
- FIMKO (SETI): EN 60950, certificate no. 12399

### FEATURES

- Isolation test voltage  $5300 V_{RMS}$
- Isolation materials according to UL94-VO
- Pollution degree 2 (DIN/VDE 0110 part 1 resp. IEC 60664)
- Climatic classification 55/100/21 (IEC 60068 part 1)
- Special construction: therefore, extra low coupling capacity of typical 0.3 pF, high common mode rejection
- Low temperature coefficient of CTR
- Rated impulse voltage (transient overvoltage)  $V_{IOTM} = 6 kV$  peak
- Isolation test voltage (partial discharge test voltage)  $V_{pd} = 1.6 kV$
- Rated isolation voltage (RMS includes DC)  $V_{IOWM} = 600 V_{RMS}$  (848 V peak)
- Rated recurring peak voltage (repetitive)  $V_{IORM} = 600 V_{RMS}$
- Thickness through insulation  $\geq 0.75 mm$
- Creepage current resistance according to VDE 0303/IEC 60112 comparative tracking index: CTI = 275
- CTR offered in 4 groups
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC


**RoHS**  
COMPLIANT

### APPLICATIONS

- Switch-mode power supplies
- Line receiver
- Computer peripheral interface
- Microprocessor system interface
- Circuits for safe protective separation against electrical shock according to safety class II (reinforced isolation):
  - for appl. class I - IV at mains voltage  $\leq 300 V$
  - for appl. class I - III at mains voltage  $\leq 600 V$  according to DIN EN 60747-5-5

### ORDER INFORMATION

| PART     | REMARKS                 |
|----------|-------------------------|
| CNY17G-1 | CTR 40 to 80 %, DIP-6   |
| CNY17G-2 | CTR 63 to 125 %, DIP-6  |
| CNY17G-3 | CTR 100 to 200 %, DIP-6 |
| CNY17G-4 | CTR 160 to 320 %, DIP-6 |

### Note

G = leadform 10.16 mm; G is marked on the body.

| ABSOLUTE MAXIMUM RATINGS <sup>(1)</sup> |                               |            |               |           |
|-----------------------------------------|-------------------------------|------------|---------------|-----------|
| PARAMETER                               | TEST CONDITION                | SYMBOL     | VALUE         | UNIT      |
| <b>INPUT</b>                            |                               |            |               |           |
| Reverse voltage                         |                               | $V_R$      | 5             | V         |
| Forward current                         |                               | $I_F$      | 60            | mA        |
| Forward surge current                   | $t_p \leq 10 \mu s$           | $I_{FSM}$  | 3             | A         |
| Power dissipation                       |                               | $P_{diss}$ | 100           | mW        |
| Junction temperature                    |                               | $T_j$      | 125           | °C        |
| <b>OUTPUT</b>                           |                               |            |               |           |
| Collector emitter voltage               |                               | $V_{CEO}$  | 32            | 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        |
| <b>COUPLER</b>                          |                               |            |               |           |
| Isolation test voltage (RMS)            |                               | $V_{ISO}$  | 3750          | $V_{RMS}$ |
| Total power dissipation                 |                               | $P_{tot}$  | 250           | mW        |
| Ambient temperature range               |                               | $T_{amb}$  | - 55 to + 100 | °C        |
| Storage temperature range               |                               | $T_{stg}$  | - 55 to + 125 | °C        |
| Soldering temperature <sup>(2)</sup>    | 2 mm from case, $t \leq 10 s$ | $T_{sld}$  | 260           | °C        |

## Notes

<sup>(1)</sup>  $T_{amb} = 25 \text{ °C}$ , 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.

<sup>(2)</sup> 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                      | $I_F = 50 \text{ mA}$                                         | $V_F$       |      | 1.25 | 1.6  | V         |
| Junction capacitance                 | $V_R = 0 \text{ V}, f = 1 \text{ MHz}$                        | $C_j$       |      | 50   |      | pF        |
| <b>OUTPUT</b>                        |                                                               |             |      |      |      |           |
| Collector emitter voltage            | $I_C = 1 \text{ mA}$                                          | $V_{CEO}$   | 32   |      |      | V         |
| Emitter collector voltage            | $I_E = 100 \mu A$                                             | $V_{ECO}$   | 7    |      |      | V         |
| Collector emitter cut-off current    | $V_{CE} = 10 \text{ V}, I_F = 0$                              | $I_{CEO}$   |      | 10   | 100  | nA        |
| <b>COUPLER</b>                       |                                                               |             |      |      |      |           |
| AC isolation test voltage (RMS)      | $f = 50 \text{ Hz}, t = 1 \text{ s}$                          | $V_{ISO}$   | 3750 |      |      | $V_{RMS}$ |
| Collector emitter saturation voltage | $I_F = 10 \text{ mA}, I_C = 1 \text{ mA}$                     | $V_{CEsat}$ |      |      | 0.3  | V         |
| Cut-off frequency                    | $V_{CE} = 5 \text{ V}, I_F = 10 \text{ mA}, R_L = 100 \Omega$ | $f_c$       |      | 110  |      | kHz       |
| Coupling capacitance                 | $f = 1 \text{ MHz}$                                           | $C_k$       |      | 0.3  |      | pF        |

## Note

$T_{amb} = 25 \text{ °C}$ , unless otherwise specified.

Minimum and maximum values were tested requirements. 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 |
|-----------|-------------------------------------------|----------|--------|------|------|------|------|
| $I_C/I_F$ | $V_{CE} = 5\text{ V}, I_F = 10\text{ mA}$ | CNY17G-1 | CTR    | 40   |      | 80   | %    |
|           |                                           | CNY17G-2 | CTR    | 63   |      | 125  | %    |
|           |                                           | CNY17G-3 | CTR    | 100  |      | 200  | %    |
|           |                                           | CNY17G-4 | CTR    | 160  |      | 320  | %    |
|           | $V_{CE} = 5\text{ V}, I_F = 1\text{ mA}$  | CNY17G-1 | CTR    | 13   |      |      | %    |
|           |                                           | CNY17G-2 | CTR    | 22   |      |      | %    |
|           |                                           | CNY17G-3 | CTR    | 34   |      |      | %    |
|           |                                           | CNY17G-2 | CTR    | 56   |      | 200  | %    |

**MAXIMUM SAFETY RATINGS**

| PARAMETER             | TEST CONDITION | SYMBOL     | MIN. | TYP. | MAX. | UNIT |
|-----------------------|----------------|------------|------|------|------|------|
| <b>INPUT</b>          |                |            |      |      |      |      |
| Forward current       |                | $I_F$      |      |      | 130  | mA   |
| <b>OUTPUT</b>         |                |            |      |      |      |      |
| Power dissipation     |                | $P_{diss}$ |      |      | 265  | mW   |
| <b>COUPLER</b>        |                |            |      |      |      |      |
| Rated impulse voltage |                | $V_{IOTM}$ |      |      | 6    | kV   |
| Safety temperature    |                | $T_{si}$   |      |      | 150  | °C   |

**Note**

According to DIN EN 60747-5-5 (see figure 1). This optocoupler is suitable for safe electrical isolation only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits.

**INSULATION RATED PARAMETERS**

| PARAMETER                                               | TEST CONDITION                                                               | SYMBOL     | MIN.      | TYP. | MAX. | UNIT     |
|---------------------------------------------------------|------------------------------------------------------------------------------|------------|-----------|------|------|----------|
| Partial discharge test voltage - routine test           | 100 %, $t_{test} = 1\text{ s}$                                               | $V_{pd}$   | 1.6       |      |      | kV       |
| Partial discharge test voltage - lot test (sample test) | $t_{Tr} = 60\text{ s}, t_{test} = 10\text{ s}$ ,<br>(see figure 2)           | $V_{IOTM}$ | 6         |      |      | kV       |
|                                                         |                                                                              | $V_{pd}$   | 1.3       |      |      | kV       |
| Insulation resistance                                   | $V_{IO} = 500\text{ V}$                                                      | $R_{IO}$   | $10^{12}$ |      |      | $\Omega$ |
|                                                         | $V_{IO} = 500\text{ V}, T_{amb} = 100\text{ °C}$                             | $R_{IO}$   | $10^{11}$ |      |      | $\Omega$ |
|                                                         | $V_{IO} = 500\text{ V}, T_{amb} = 150\text{ °C}$<br>(construction test only) | $R_{IO}$   | $10^9$    |      |      | $\Omega$ |

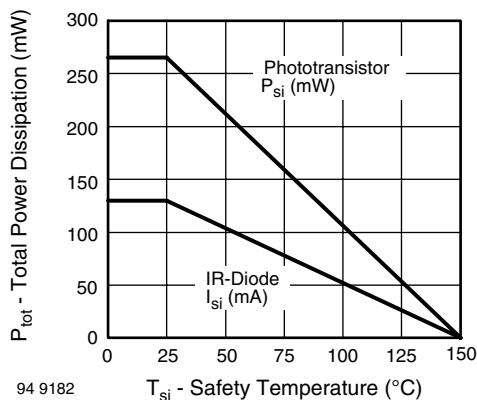
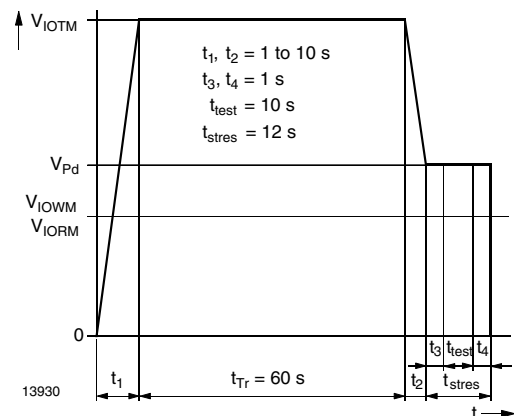


Fig. 1 - Derating Diagram


Fig. 2 - Test Pulse Diagram for Sample Test According to  
DIN EN 60747-5-5/DIN EN 60747-; IEC60747

## SWITCHING CHARACTERISTICS

| PARAMETER     | TEST CONDITION                                                                           | SYMBOL    | MIN. | TYP. | MAX. | UNIT          |
|---------------|------------------------------------------------------------------------------------------|-----------|------|------|------|---------------|
| Delay time    | $V_S = 5\text{ V}$ , $I_C = 5\text{ mA}$ , $R_L = 100\ \Omega$ ,<br>(see figure 3)       | $t_d$     |      | 4.0  |      | $\mu\text{s}$ |
| Rise time     | $V_S = 5\text{ V}$ , $I_C = 5\text{ mA}$ , $R_L = 100\ \Omega$ ,<br>(see figure 3)       | $t_r$     |      | 7.0  |      | $\mu\text{s}$ |
| Fall time     | $V_S = 5\text{ V}$ , $I_C = 5\text{ mA}$ , $R_L = 100\ \Omega$ ,<br>(see figure 3)       | $t_f$     |      | 6.7  |      | $\mu\text{s}$ |
| Storage time  | $V_S = 5\text{ V}$ , $I_C = 5\text{ mA}$ , $R_L = 100\ \Omega$ ,<br>(see figure 3)       | $t_s$     |      | 0.3  |      | $\mu\text{s}$ |
| Turn-on time  | $V_S = 5\text{ V}$ , $I_C = 5\text{ mA}$ , $R_L = 100\ \Omega$ ,<br>(see figure 3)       | $t_{on}$  |      | 11.0 |      | $\mu\text{s}$ |
| Turn-off time | $V_S = 5\text{ V}$ , $I_C = 5\text{ mA}$ , $R_L = 100\ \Omega$ ,<br>(see figure 3)       | $t_{off}$ |      | 7.0  |      | $\mu\text{s}$ |
| Turn-on time  | $V_S = 5\text{ V}$ , $I_F = 10\text{ mA}$ , $R_L = 1\text{ k}\Omega$ ,<br>(see figure 4) | $t_{on}$  |      | 25   |      | $\mu\text{s}$ |
| Turn-off time | $V_S = 5\text{ V}$ , $I_F = 10\text{ mA}$ , $R_L = 1\text{ k}\Omega$ ,<br>(see figure 4) | $t_{off}$ |      | 42.5 |      | $\mu\text{s}$ |

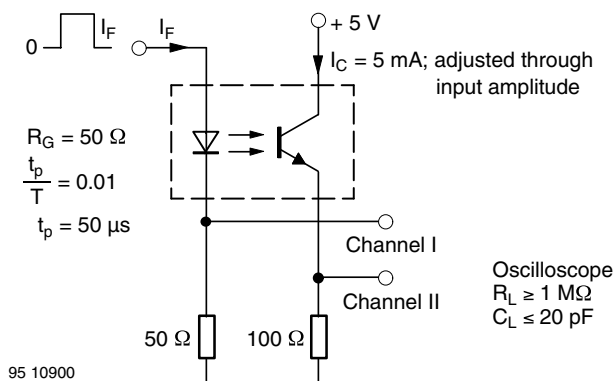


Fig. 3 - Test Circuit, Non-Saturated Operation

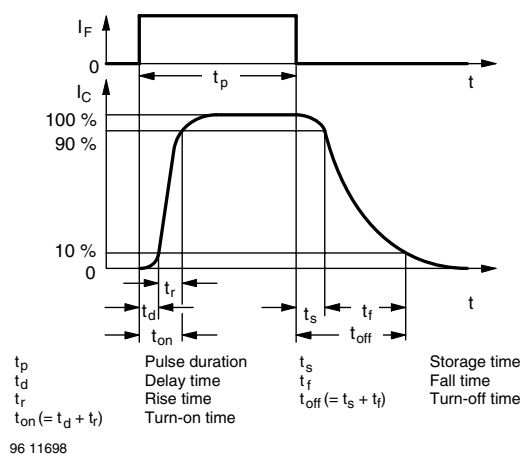


Fig. 5 - Switching Times

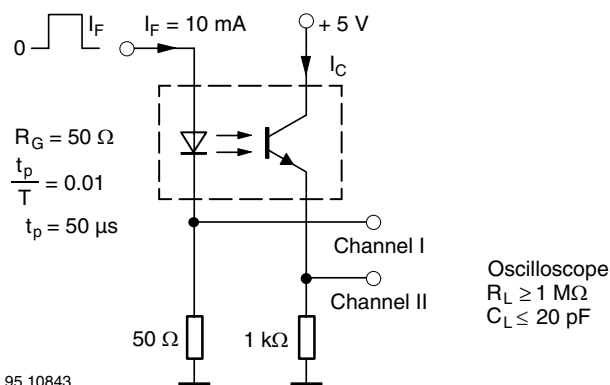


Fig. 4 - Test Circuit, Saturated Operation

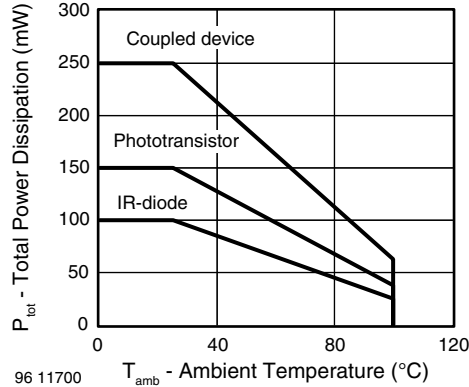
**TYPICAL CHARACTERISTICS**
 $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified


Fig. 6 - Total Power Dissipation vs. Ambient Temperature

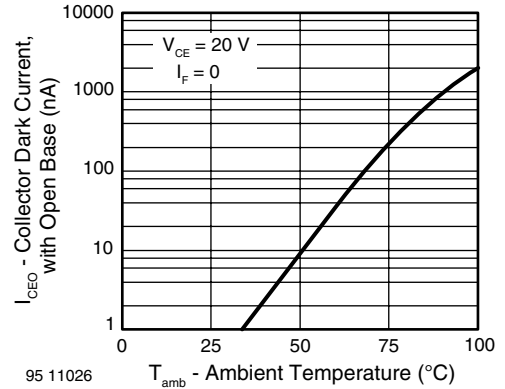


Fig. 9 - Collector Dark Current vs. Ambient Temperature

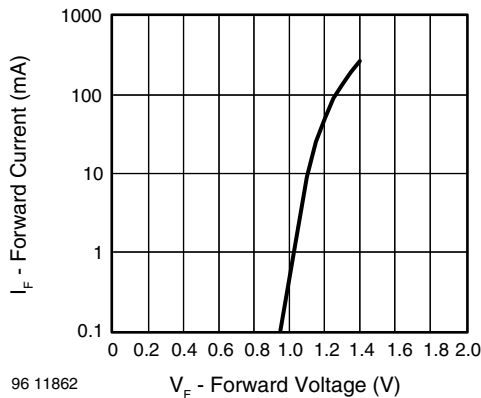


Fig. 7 - Forward Current vs. Forward Voltage

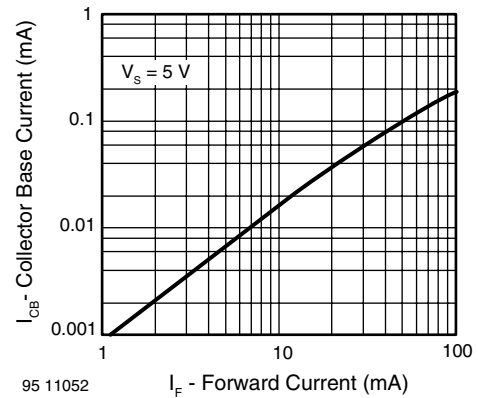


Fig. 10 - Collector Base Current vs. Forward Current

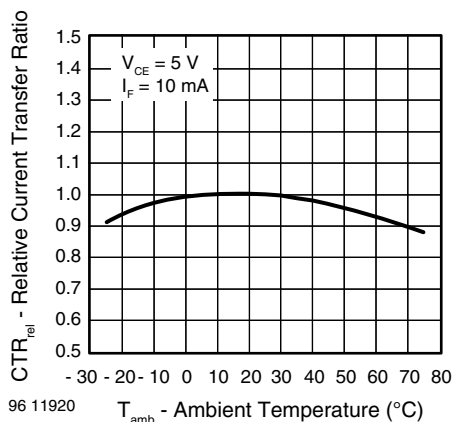


Fig. 8 - Relative Current Transfer Ratio vs. Ambient Temperature

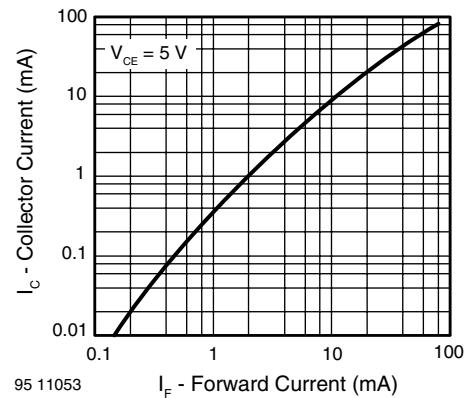


Fig. 11 - Collector Current vs. Forward Current

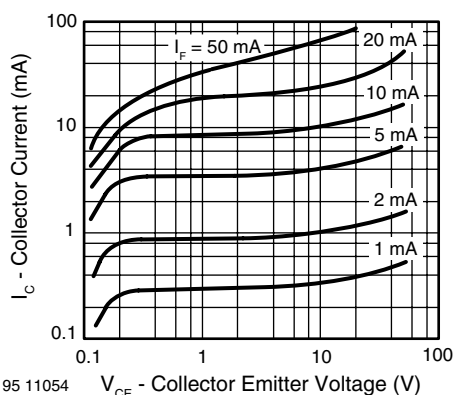


Fig. 12 - Collector Current vs. Collector Emitter Voltage

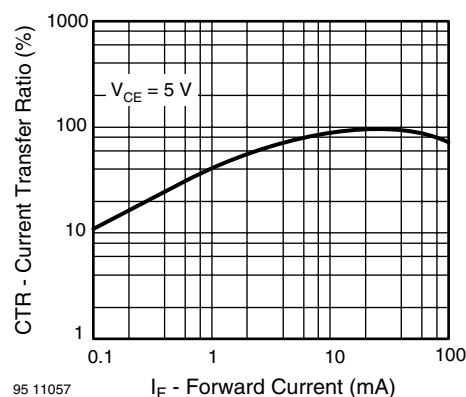


Fig. 15 - Current Transfer Ratio vs. Forward Current

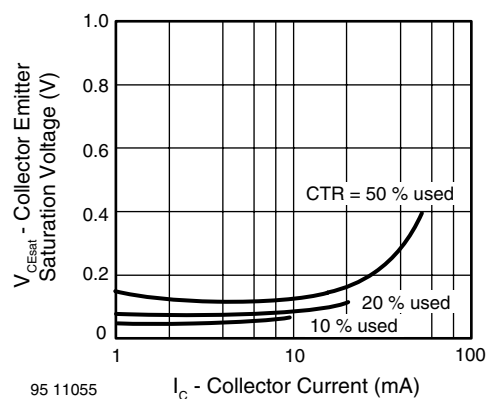


Fig. 13 - Collector Emitter Saturation Voltage vs. Collector Current

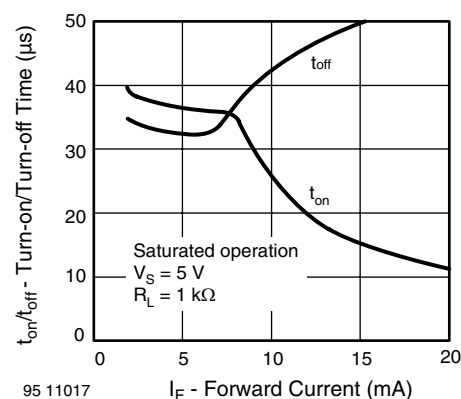


Fig. 16 - Turn-on/off Time vs. Forward Current

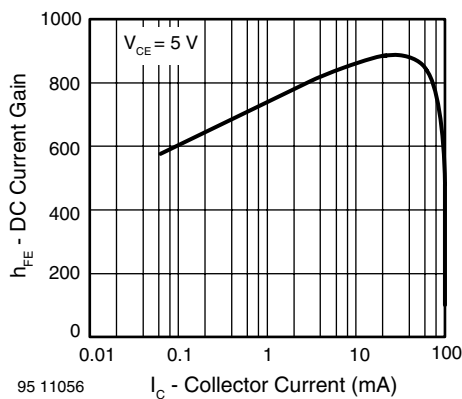


Fig. 14 - DC Current Gain vs. Collector Current

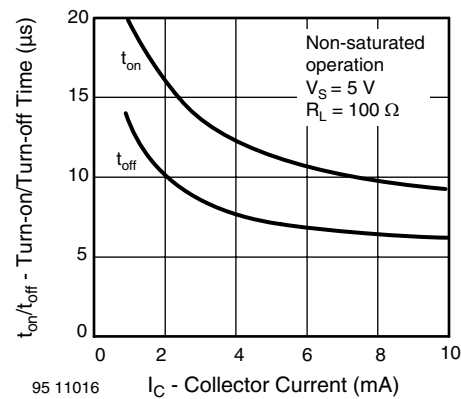
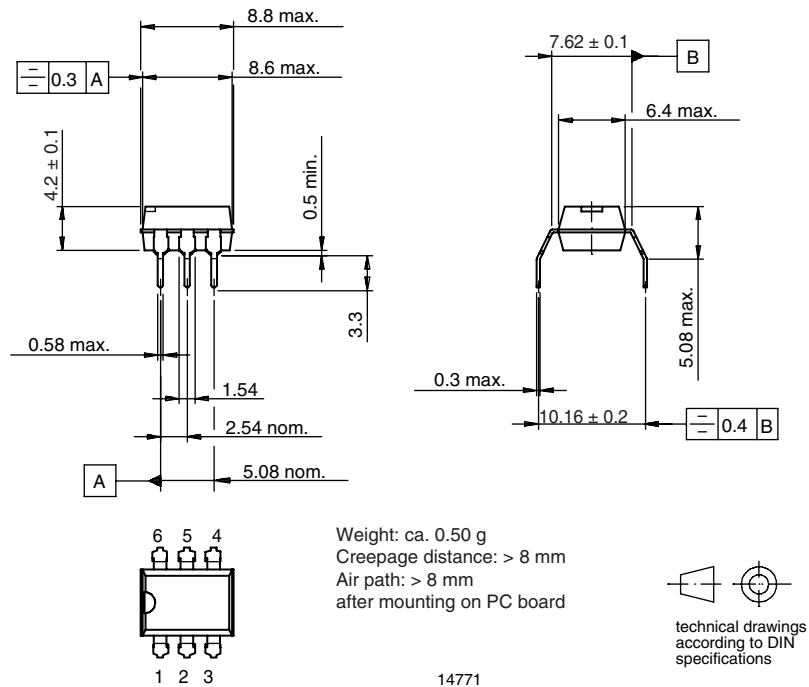


Fig. 17 - Turn-on/off Time vs. Collector Current

**PACKAGE DIMENSIONS** in 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.

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