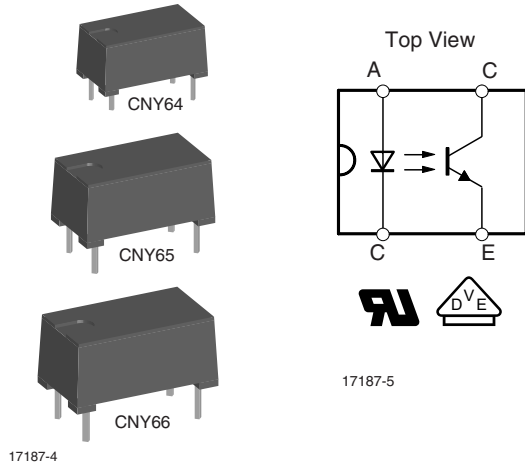


Optocoupler, Phototransistor Output, Very High Isolation Voltage



DESCRIPTION

The CNY64, CNY65, and CNY66 consist of a phototransistor optically coupled to a gallium arsenide infrared-emitting diode in a 4 pin plastic package. The single components are mounted opposite one another, providing a distance between input and output for highest safety requirements of > 3 mm.

VDE STANDARDS

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

- **DIN EN 60747-5-5 (VDE 0884)**
Optocoupler for electrical safety requirements
- **IEC 60950/EN 60950**
Office machines
- **VDE 0804**
Telecommunication apparatus and data processing
- **IEC 60065**
Safety for mains-operated electronic and related household apparatus
- **VDE 0700/IEC 60335**
Household equipment
- **VDE 0160**
Electronic equipment for electrical power installation
- **VDE 0750/IEC 60601**
Medical equipment

FEATURES

- Rated recurring peak voltage (repetitive)
 $V_{IORM} = 1450 V_{peak}$
- Thickness through insulation ≥ 3 mm
- Creepage current resistance according to VDE 0303/IEC 60112 comparative tracking index: **CTI ≥ 200**
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC



RoHS
COMPLIANT

APPLICATIONS

Circuits for safe protective separation against electrical shock according to safety class II (reinforced isolation):

- for appl. class I - IV at mains voltage ≤ 300 V
- for appl. class I - IV at mains voltage ≤ 600 V
- for appl. class I - III at mains voltage ≤ 1000 V according to DIN EN 60747-5-5 (VDE 0884), suitable for:
 - Switch-mode power supplies
 - Line receiver
 - Computer peripheral interface
 - Microprocessor system interface

AGENCY APPROVALS

- UL1577, file no. E76222 system code H, J, and K
- DIN EN 60747-5-5 (VDE 0884)
- VDE related features:
 - rated impulse voltage (transient overvoltage),
 $V_{IOTM} = 12$ kV peak
 - isolation test voltage (partial discharge test voltage),
 $V_{pd} = 2.8$ kV peak

| ORDER INFORMATION | |
|-------------------|--|
| PART | REMARKS |
| CNY64 | CTR 50 % to 300 %, high isolation distance, 4 pin |
| CNY65 | CTR 50 % to 300 %, high isolation distance, 4 pin |
| CNY66 | CTR 50 % to 300 %, high isolation distance, 4 pin |
| CNY64A | CTR 63 % to 125 %, high isolation distance, 4 pin |
| CNY65A | CTR 63 % to 125 %, high isolation distance, 4 pin |
| CNY64B | CTR 100 % to 200 %, high isolation distance, 4 pin |
| CNY65B | CTR 100 % to 200 %, high isolation distance, 4 pin |

| ABSOLUTE MAXIMUM RATINGS ⁽¹⁾ | | | | |
|---|-------------------------------|------------|---------------|------|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| INPUT | | | | |
| Reverse voltage | | V_R | 5 | V |
| Forward current | | I_F | 75 | mA |
| Forward surge current | $t_p \leq 10 \mu s$ | I_{FSM} | 1.5 | A |
| Power dissipation | | P_{diss} | 120 | mW |
| Junction temperature | | T_j | 100 | °C |
| OUTPUT | | | | |
| 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} | 130 | mW |
| Junction temperature | | T_j | 100 | °C |
| COUPLER | | | | |
| AC isolation test voltage CNY64 | $t = 1 min$ | V_{ISO} | 8.2 | kV |
| DC isolation test voltage CNY65 | $t = 1 s$ | V_{ISO} | 13.9 | kV |
| DC isolation test voltage CNY66 | $t = 1 s$ | V_{ISO} | 13.9 | kV |
| Total power dissipation | | P_{tot} | 250 | mW |
| Ambient temperature range | | T_{amb} | - 55 to + 85 | °C |
| Storage temperature range | | T_{stg} | - 55 to + 100 | °C |
| Soldering temperature | 2 mm from case, $\leq 10 s$ | T_{slid} | 260 | °C |

Note

⁽¹⁾ $T_{amb} = 25 \text{ }^\circ\text{C}$, 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.

| ELECTRICAL CHARACTERISTICS ⁽¹⁾ | | | | | | |
|---|---|-------------|------|------|------|------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| INPUT | | | | | | |
| Forward voltage | $I_F = 50 mA$ | V_F | | 1.25 | 1.6 | V |
| Junction capacitance | $V_R = 0, f = 1 MHz$ | C_j | | 50 | | pF |
| OUTPUT | | | | | | |
| Collector emitter voltage | $I_C = 1 mA$ | V_{CEO} | 32 | | | V |
| Emitter collector voltage | $I_E = 100 \mu A$ | V_{ECO} | 7 | | | V |
| Collector emitter leakage current | $V_{CE} = 20 V, I_F = 0 A$ | I_{CEO} | | | 200 | nA |
| COUPLER | | | | | | |
| Collector emitter saturation voltage | $I_F = 10 mA, I_C = 1 mA$ | V_{CEsat} | | | 0.3 | V |
| Cut-off frequency | $V_{CE} = 5 V, I_F = 10 mA, R_L = 100 \Omega$ | f_c | | 110 | | kHz |
| Coupling capacitance | $f = 1 MHz$ | C_k | | 0.3 | | pF |

Note

⁽¹⁾ $T_{amb} = 25 \text{ }^\circ\text{C}$, 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 | V _{CE} = 5 V, I _F = 10 mA | CNY64, CNY65, CNY66 | CTR | 50 | | 300 | % |
| | | CNY64A | CTR | 63 | | 125 | % |
| | | CNY65A | CTR | 63 | | 125 | % |
| | | CNY64B | CTR | 100 | | 200 | % |
| | | CNY65B | CTR | 100 | | 200 | % |

| MAXIMUM SAFETY RATINGS (1) | | | | | | |
|----------------------------|----------------|-------------------|------|------|------|------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| INPUT | | | | | | |
| Forward current | | I _F | | | 120 | mA |
| OUTPUT | | | | | | |
| Power dissipation | | P _{diss} | | | 250 | mW |
| COUPLER | | | | | | |
| Rated impulse voltage | | V _{IOTM} | | | 10 | kV |
| Safety temperature | | T _{si} | | | 150 | °C |

Note

(1) 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 s | V _{pd} | 2.8 | | | kV |
| Partial discharge test voltage - lot test (sample test) | t _{Tr} = 60 s, t _{test} = 10 s, (see figure 2) | V _{pd} | 2.2 | | | kV |
| Insulation 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 |
| | V _{IO} = 500 V, T _{amb} = 150 °C (construction test only) | R _{IO} | 10 ⁹ | | | Ω |

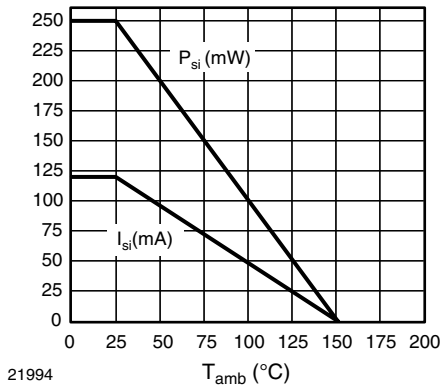


Fig. 1 - Safety Derating Diagram

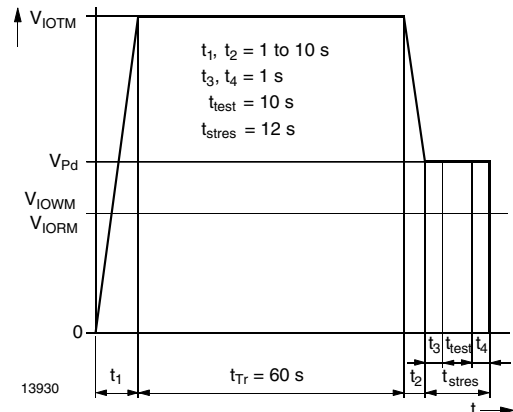


Fig. 2 - Test Pulse Diagram for Sample Test According to DIN EN 60747-5-5/DIN EN 60747-; IEC 60747

| SWITCHING CHARACTERISTICS | | | | | | |
|---------------------------|---|-----------|------|------|------|---------------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Delay time | $V_S = 5\text{ V}$, $I_C = 5\text{ mA}$, $R_L = 100\ \Omega$, (see figure 3) | t_d | | 2.6 | | μs |
| Rise time | $V_S = 5\text{ V}$, $I_C = 5\text{ mA}$, $R_L = 100\ \Omega$, (see figure 3) | t_r | | 2.4 | | μs |
| Fall time | $V_S = 5\text{ V}$, $I_C = 5\text{ mA}$, $R_L = 100\ \Omega$, (see figure 3) | t_f | | 2.7 | | μs |
| Storage time | $V_S = 5\text{ V}$, $I_C = 5\text{ mA}$, $R_L = 100\ \Omega$, (see figure 3) | t_s | | 0.3 | | μs |
| Turn-on time | $V_S = 5\text{ V}$, $I_C = 5\text{ mA}$, $R_L = 100\ \Omega$, (see figure 3) | t_{on} | | 5 | | μs |
| Turn-off time | $V_S = 5\text{ V}$, $I_C = 5\text{ mA}$, $R_L = 100\ \Omega$, (see figure 3) | t_{off} | | 3 | | μs |
| Turn-on time | $V_S = 5\text{ V}$, $I_F = 10\text{ mA}$, $R_L = 1\text{ k}\Omega$, (see figure 4) | t_{on} | | 25 | | μs |
| Turn-off time | $V_S = 5\text{ V}$, $I_F = 10\text{ mA}$, $R_L = 1\text{ k}\Omega$, (see figure 4) | t_{off} | | 42.5 | | μs |

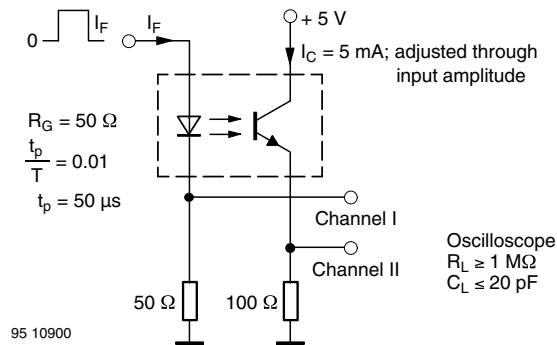


Fig. 3 - Test Circuit, Non-Saturated Operation

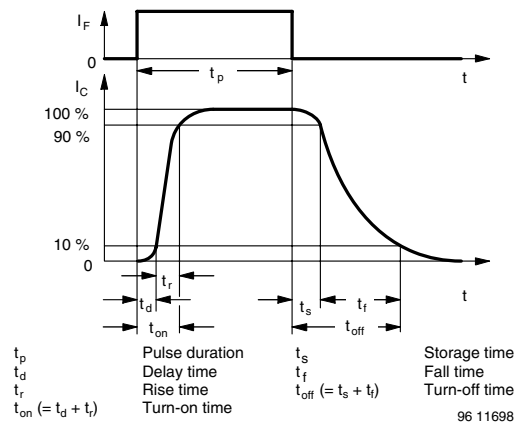


Fig. 5 - Switching Times

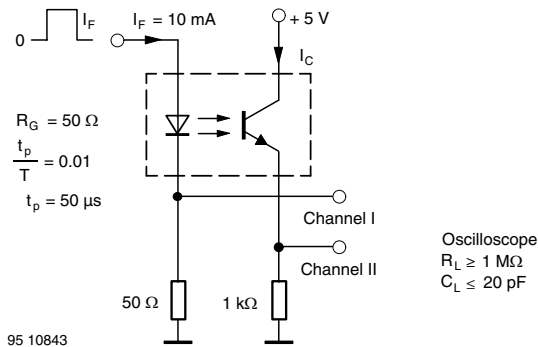


Fig. 4 - Test Circuit, Saturated Operation



TYPICAL CHARACTERISTICS

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

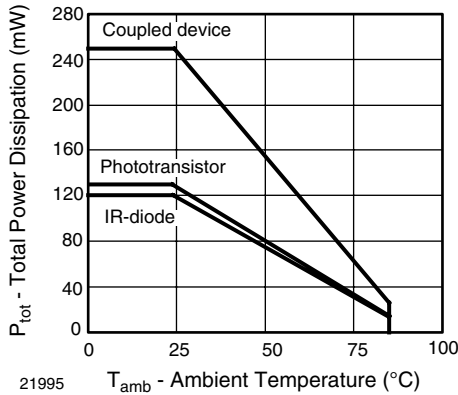


Fig. 6 - Total Power Dissipation vs. Ambient Temperature

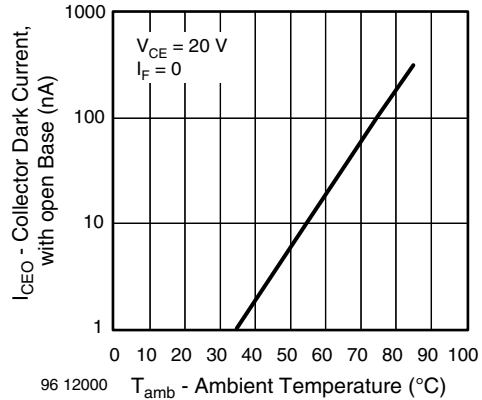


Fig. 9 - Collector Dark Current vs. Ambient Temperature

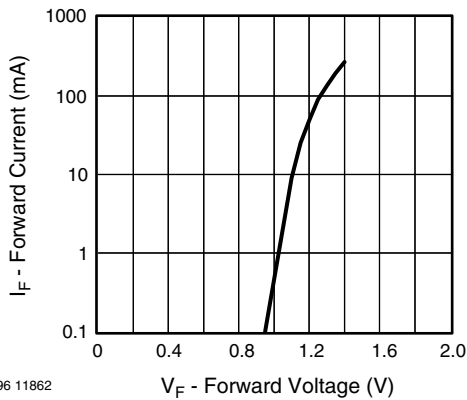


Fig. 7 - Forward Current vs. Forward Voltage

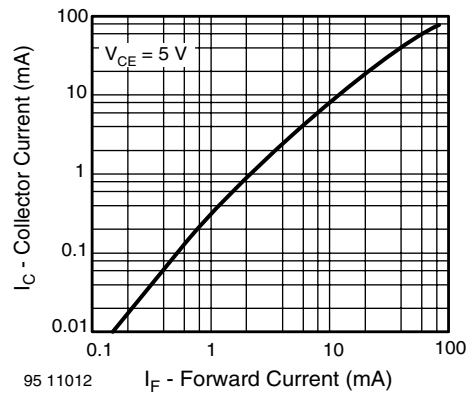


Fig. 10 - Collector Current vs. Forward Current

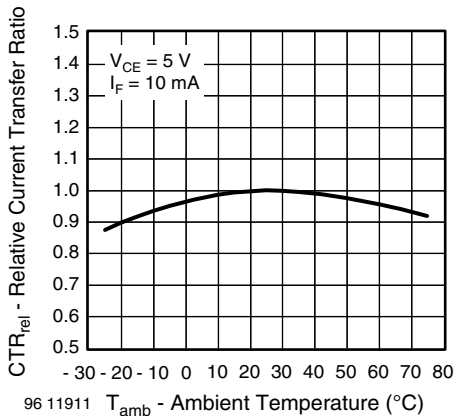


Fig. 8 - Relative Current Transfer Ratio vs. Ambient Temperature

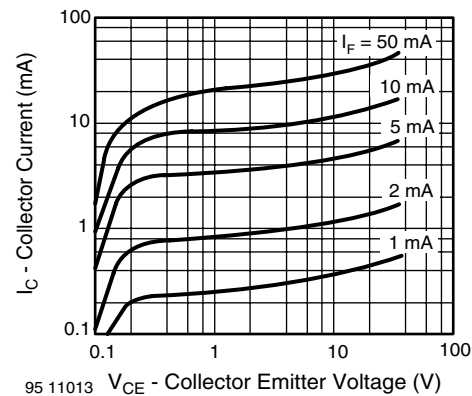


Fig. 11 - Collector Current vs. Collector Emitter Voltage

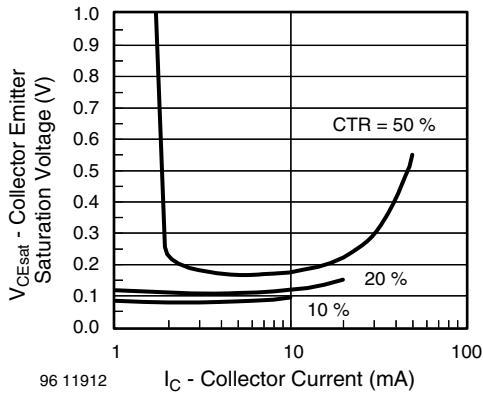


Fig. 12 - Collector Emitter Saturation Voltage vs. Collector Current

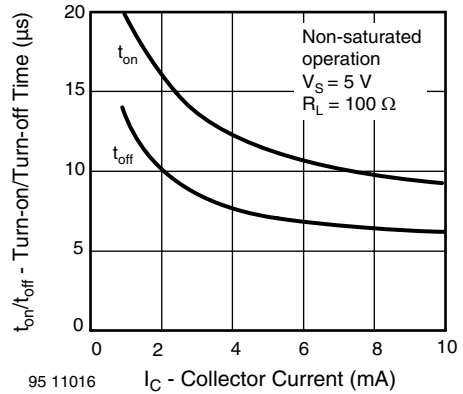


Fig. 15 - Turn-on/Turn-off Time vs. Forward Current

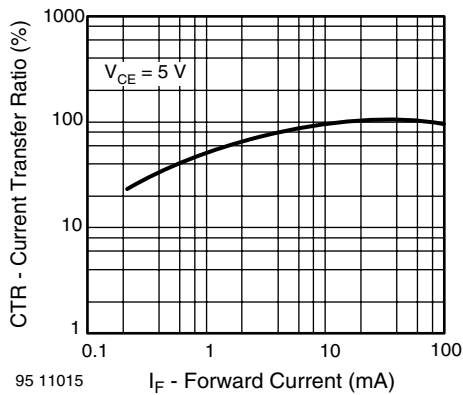


Fig. 13 - Current Transfer Ratio vs. Forward Current

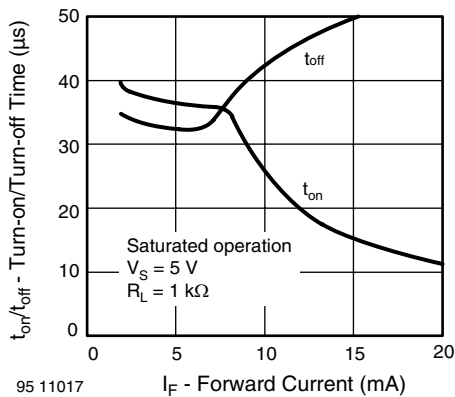


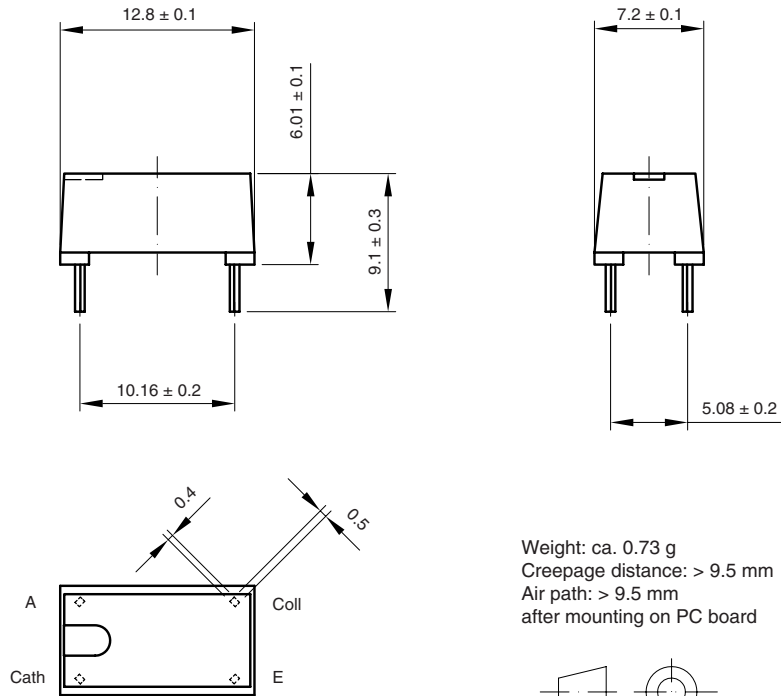
Fig. 14 - Turn-on/Turn-off Time vs. Collector Current



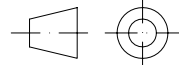
CNY64, CNY65, CNY66

Optocoupler, Phototransistor Output, Vishay Semiconductors
Very High Isolation Voltage

PACKAGE DIMENSIONS in millimeters FOR CNY64



Weight: ca. 0.73 g
Creepage distance: > 9.5 mm
Air path: > 9.5 mm
after mounting on PC board



technical drawings
according to DIN
specifications

Drawing-No.: 6.544-5038.01-4

Issue: 2; 10.11.98

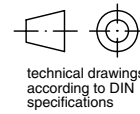
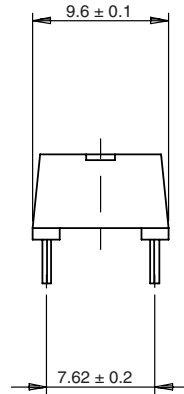
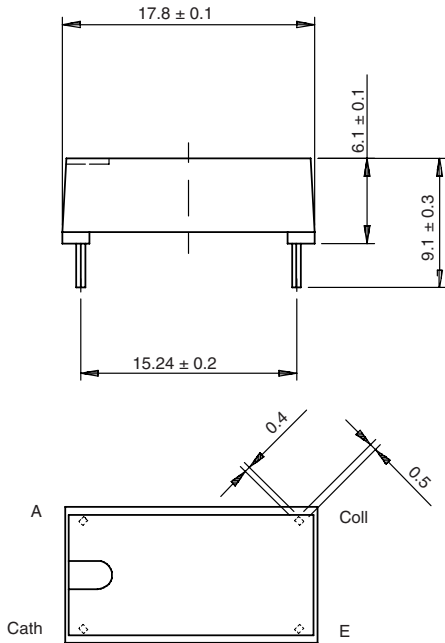
14765

CNY64, CNY65, CNY66



Vishay Semiconductors Optocoupler, Phototransistor Output,
Very High Isolation Voltage

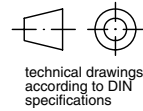
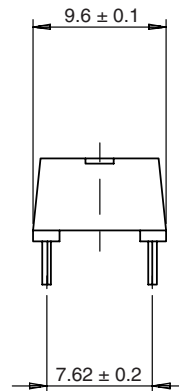
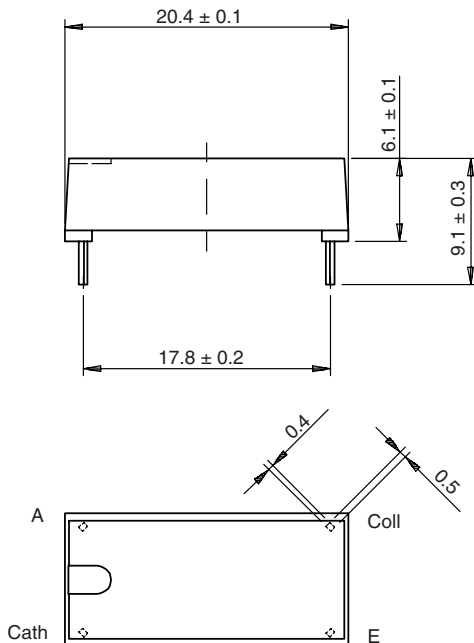
PACKAGE DIMENSIONS in millimeters FOR CNY65



Weight: ca. 1.40 g
Creepage distance: > 14 mm
Air path: > 14 mm
after mounting on PC board

14763

PACKAGE DIMENSIONS in millimeters FOR CNY66



Weight: ca. 1.70 g
Creepage distance: > 17 mm
Air path: > 17 mm
after mounting on PC board

14764



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