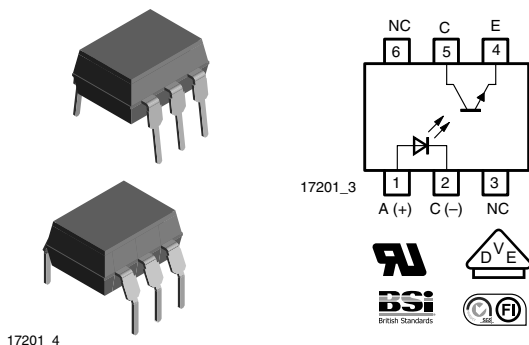


Optocoupler, Phototransistor Output



DESCRIPTION

The TCDT1100, TCDT1100G series consists of a phototransistor optically coupled to a gallium arsenide infrared-emitting diode in a 6 pin plastic dual inline package. The base of the phototransistor is not connected providing noise immunity.

VDE STANDARDS

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

- **DIN EN 60747-5-5 (VDE0884)**
Optocoupler for electrical safety requirements
- **IEC 60950/EN 60950**
Office machines (applied for reinforced isolation for mains voltage $\leq 400 V_{RMS}$)
- **VDE0804**
Telecommunication apparatus and data processing
- **IEC 60065**
Safety for mains-operated electronic and related household apparatus

FEATURES

- Isolation test voltage $5000 V_{RMS}$
- High common mode rejection
- No base terminal connection for improved noise immunity
- CTR offered in 4 groups
- Thickness through insulation $\geq 0.4 \text{ mm}$
- Creepage current resistance according to VDE0303/ IEC 60112 comparative tracking index: $CTI \geq 275$
- Compliant to RoHS directive 2002/95/EC and in accordance to 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 $\leq 300 \text{ V}$
 - for appl. class I - III at mains voltage $\leq 600 \text{ V}$ according to DIN EN 60747-5-5

AGENCY APPROVALS

- UL1577, file no. E52744, double protection
- BSI IEC 60950; IEC 60065 pending
- DIN EN 60747-5-5 (VDE0884)
- FIMKO

| ORDER INFORMATION | |
|-------------------|------------------------------------|
| PART | REMARKS |
| TCDT1100 | CTR > 40 %, DIP-6 |
| TCDT1101 | CTR 40 % to 80 %, DIP-6 |
| TCDT1102 | CTR 63 % to 125 %, DIP-6 |
| TCDT1103 | CTR 100 % to 200 %, DIP-6 |
| TCDT1100G | CTR > 40 %, DIP-6, 400 mil |
| TCDT1101G | CTR 40 % to 80 %, DIP-6, 400 mil |
| TCDT1102G | CTR 63 % to 125 %, DIP-6, 400 mil |
| TCDT1103G | CTR 100 % to 200 %, DIP-6, 400 mil |

Note

- G = leadform 10.16 mm; G is not marked on the body.



| ABSOLUTE MAXIMUM RATINGS (1) ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | |
|--|--------------------------------------|------------|---------------|--------------------|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| INPUT | | | | |
| Reverse voltage | | V_R | 5 | V |
| Forward current | | I_F | 60 | mA |
| Forward surge current | $t_p \leq 10\text{ }\mu\text{s}$ | I_{FSM} | 3 | A |
| Power dissipation | | P_{diss} | 70 | mW |
| Junction temperature | | T_j | 125 | $^{\circ}\text{C}$ |
| OUTPUT | | | | |
| Collector emitter voltage | | V_{CEO} | 32 | V |
| Emitter collector voltage | | V_{ECO} | 7 | V |
| Collector current | | I_C | 50 | mA |
| Collector peak current | $t_p/T = 0.5, t_p \leq 10\text{ ms}$ | I_{CM} | 100 | mA |
| Power dissipation | | P_{diss} | 70 | mW |
| Junction temperature | | T_j | 125 | $^{\circ}\text{C}$ |
| COUPLER | | | | |
| Isolation test voltage (RMS) | | V_{ISO} | 5000 | V_{RMS} |
| Total power dissipation | | P_{tot} | 200 | mW |
| Ambient temperature range | | T_{amb} | - 55 to + 110 | $^{\circ}\text{C}$ |
| Storage temperature range | | T_{stg} | - 55 to + 125 | $^{\circ}\text{C}$ |
| Soldering temperature (2) | 2 mm from case, $t \leq 10\text{ s}$ | T_{sld} | 260 | $^{\circ}\text{C}$ |

Notes

- (1) 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 (1) ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | |
|--|--|-------------|------|------|------|------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| INPUT | | | | | | |
| Forward voltage | $I_F = 50\text{ mA}$ | V_F | | 1.25 | 1.6 | V |
| Junction capacitance | $V_R = 0, f = 1\text{ MHz}$ | C_j | | 50 | | pF |
| OUTPUT | | | | | | |
| Collector emitter voltage | $I_C = 1\text{ mA}$ | V_{CEO} | 32 | | | V |
| Emitter collector voltage | $I_E = 100\text{ }\mu\text{A}$ | V_{ECO} | 7 | | | V |
| Collector emitter cut-off current | $V_{CE} = 20\text{ V}, I_F = 0, E = 0$ | I_{CEO} | | 200 | | nA |
| COUPLER | | | | | | |
| Collector emitter saturation voltage | $I_F = 10\text{ mA}, I_C = 1\text{ mA}$ | V_{CEsat} | | | 0.3 | V |
| Cut-off frequency | $V_{CE} = 5\text{ V}, I_F = 10\text{ mA}, R_L = 100\text{ }\Omega$ | f_c | | 110 | | kHz |
| Coupling capacitance | $f = 1\text{ MHz}$ | C_k | | 0.6 | | pF |

Note

- (1) Minimum and maximum values are testing 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 | $V_{CE} = 5\text{ V}, I_F = 10\text{ mA}$ | TCDT1100 | CTR | 40 | | | % |
| | | TCDT1100G | CTR | | | | % |
| | | TCDT1101 | CTR | 40 | | 80 | % |
| | | TCDT1101G | CTR | | | | % |
| | | TCDT1102 | CTR | 63 | | 125 | % |
| | | TCDT1102G | CTR | | | | % |
| | | TCDT1103 | CTR | 100 | | 200 | % |
| | | TCDT1103G | CTR | | | | % |

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

Note

- According to DIN EN 60747-5-5. 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) | $t_{Tr} = 60\text{ s}, t_{test} = 10\text{ s},$ (see figure 1) | V_{IOTM} | 6 | | | kV |
| | | V_{pd} | 1.3 | | | kV |
| Insulation resistance | $V_{IO} = 500\text{ V}$ | R_{IO} | 10^{12} | | | Ω |
| | $V_{IO} = 500\text{ V}, T_{amb} = 100\text{ °C}$ | R_{IO} | 10^{11} | | | Ω |
| | $V_{IO} = 500\text{ V}, T_{amb} = 150\text{ °C}$ (construction test only) | R_{IO} | 10^9 | | | Ω |

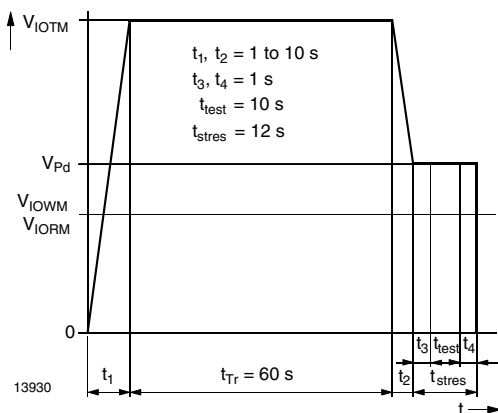


Fig. 1 - Test Pulse Diagram for Sample Test According to DIN EN 60747-5-5/DIN EN 60747-; IEC60747

| SWITCHING CHARACTERISTICS | | | | | | |
|---------------------------|---|-----------|------|------|------|---------------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Delay time | $V_S = 5\text{ V}$, $I_C = 5\text{ mA}$, $R_L = 100\ \Omega$, (see figure 2) | t_d | | 4 | | μs |
| Rise time | $V_S = 5\text{ V}$, $I_C = 5\text{ mA}$, $R_L = 100\ \Omega$, (see figure 2) | t_r | | 7 | | μs |
| Fall time | $V_S = 5\text{ V}$, $I_C = 5\text{ mA}$, $R_L = 100\ \Omega$, (see figure 2) | t_f | | 6.7 | | μs |
| Storage time | $V_S = 5\text{ V}$, $I_C = 5\text{ mA}$, $R_L = 100\ \Omega$, (see figure 2) | t_s | | 0.3 | | μs |
| Turn-on time | $V_S = 5\text{ V}$, $I_C = 5\text{ mA}$, $R_L = 100\ \Omega$, (see figure 2) | t_{on} | | 11 | | μs |
| Turn-off time | $V_S = 5\text{ V}$, $I_C = 5\text{ mA}$, $R_L = 100\ \Omega$, (see figure 2) | t_{off} | | 7 | | μs |
| Turn-on time | $V_S = 5\text{ V}$, $I_C = 10\text{ mA}$, $R_L = 1\text{ k}\Omega$, (see figure 3) | t_{on} | | 25 | | μs |
| Turn-off time | $V_S = 5\text{ V}$, $I_C = 10\text{ mA}$, $R_L = 1\text{ k}\Omega$, (see figure 3) | t_{off} | | 42.5 | | μs |

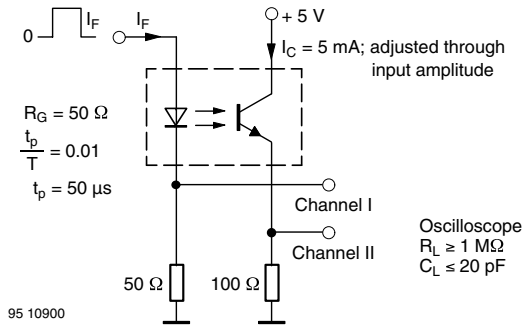


Fig. 2 - Test Circuit, Non-Saturated Operation

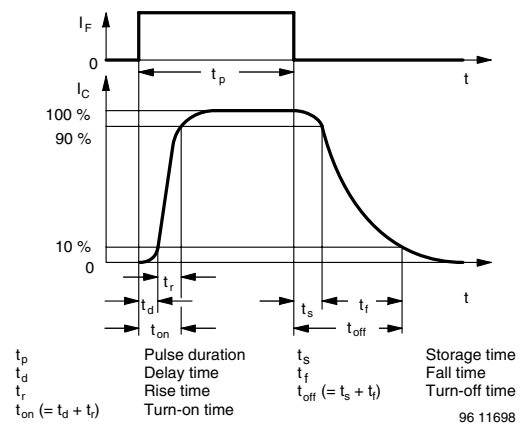


Fig. 4 - Switching Times

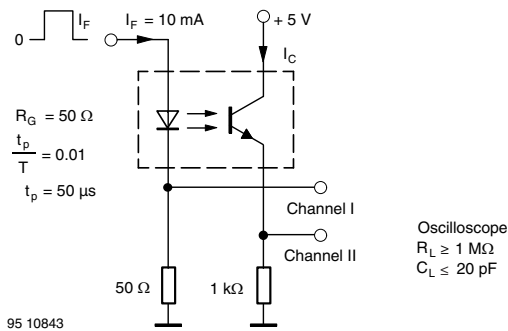


Fig. 3 - Test Circuit, Saturated Operation

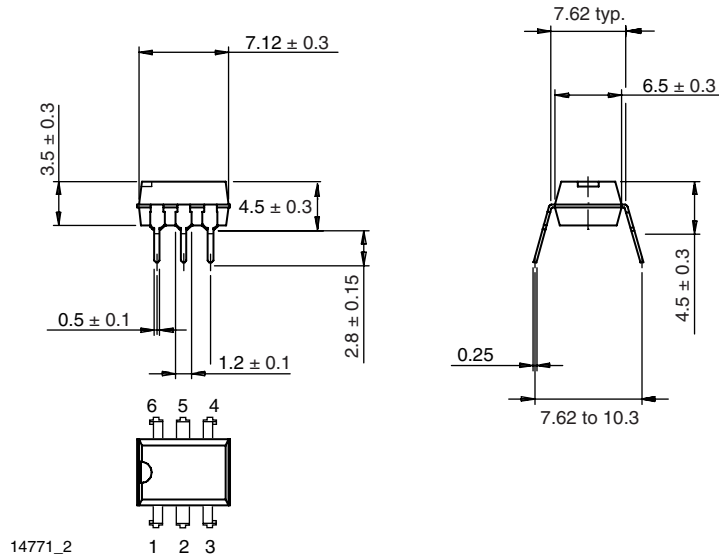
TCDT1100, TCDT1100G

Vishay Semiconductors Optocoupler, Phototransistor Output

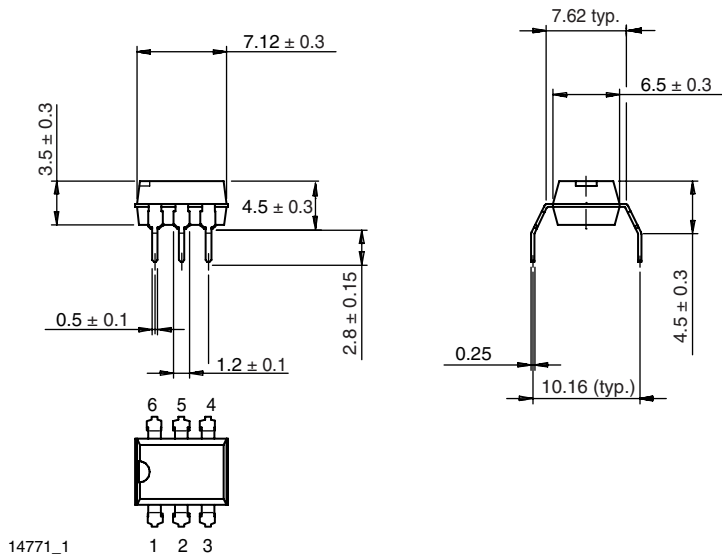


PACKAGE DIMENSIONS in millimeters

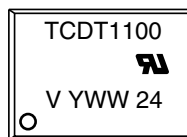
DIP-6



DIP-6, 400 mil



PACKAGE MARKING





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