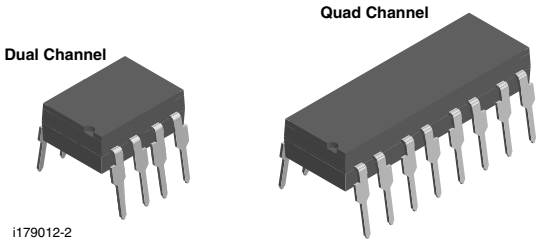
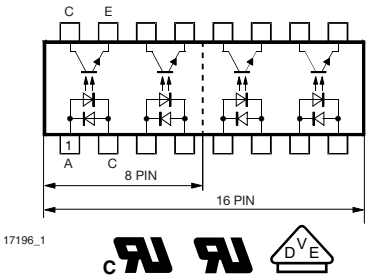
# Optocoupler, Phototransistor Output, AC Input (Dual, Quad Channel)




## FEATURES

- Extra low coupling capacity - typical 0.2 pF
- High common mode rejection
- Low temperature coefficient of CTR
- Rated impulse voltage (transient overvoltage) $V_{IOTM}$ = 10 kV peak
- Isolation test voltage (partial discharge test voltage) $V_{pd}$ = 1.6 kV peak
- Rated isolation voltage (RMS includes DC) $V_{IOWM}$ = 600 $V_{RMS}$
- Rated recurring peak voltage (repetitive) $V_{IORM}$ = 848 $V_{peak}$
- Thickness though insulation ≥ 0.4 mm
- Creepage current resistance according to VDE 0303/ IEC 60112 comparative tracking index: CTI ≥ 175
- Compliant to RoHS Directive to 2002/95/EC and in accordance WEEE 2002/96/EC

Pb-free

e3

RoHS COMPLIANT

## AGENCY APPROVALS

- UL1577, file no. E52744 system code H, double protection
- CSA 22.2 bulletin 5A, double protection
- DIN EN 60747-5-2 (VDE 0884)
  DIN EN 60747-5-5 (pending)
- FIMKO

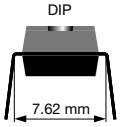
## DESCRIPTION

The TCET2600, TCET4600 consists of a phototransistor optically coupled to 2 gallium arsenide infrared-emitting diodes in 8 pin or 16 lead plastic dual inline package.

## ORDERING INFORMATION

| T | C | E | T | # | 6 | 0 | 0 |
|---|---|---|---|---|---|---|---|

PART NUMBER




| AGENCY CERTIFIED/ PACKAGE | CTR (%) |
|---|---|
| | ± 5 mA |
| **UL, cUL, VDE, FIMKO** | **20 to 300** |
| DIP-8, dual channel | TCET2600 |
| DIP-16, quad channel | TCET4600 |

## ABSOLUTE MAXIMUM RATINGS (1) ($T_{amb}$ = 25 °C, unless otherwise specified)

| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
|---|---|---|---|---|
| **INPUT** | | | | |
| Reverse voltage | | $V_R$ | 6 | V |
| Forward current | | $I_F$ | ± 60 | mA |
| Forward surge current | $t_p \leq 10$ µs | $I_{FSM}$ | ± 1.5 | A |
| Power dissipation | | $P_{diss}$ | 100 | mW |
| Junction temperature | | $T_j$ | 125 | °C |

| ABSOLUTE MAXIMUM RATINGS [1] ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | |
|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **VALUE** | **UNIT** |
| **OUTPUT** | | | | |
| 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 |
| **COUPLER** | | | | |
| Isolation test voltage (RMS) | t = 1 s | $V_{ISO}$ | 5300 | $V_{RMS}$ |
| Isolation voltage | | $V_{IORM}$ | 890 | $V_P$ |
| Total power dissipation | | $P_{tot}$ | 250 | mW |
| Operating ambient temperature range | | $T_{amb}$ | - 55 to + 100 | °C |
| Storage temperature range | | $T_{stg}$ | - 55 to + 150 | °C |
| Soldering temperature [2] | 2 mm from case, t ≤ 10 s | $T_{sld}$ | 260 | °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 Rating for extended periods of the time can adversely affect reliability.

[2] Refer to wave profile for soldering conditions for through hole devices.

| ELECTRICAL CHARACTERISTCS ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **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 V, f = 1 MHz | $C_j$ | | 50 | | pF |
| **OUTPUT** | | | | | | |
| Collector emitter voltage | $I_C$ = 100 µA | $V_{CEO}$ | 70 | | | V |
| Emitter collector voltage | $I_E$ = 100 µA | $V_{ECO}$ | 7 | | | V |
| Collector dark current | $V_{CE}$ = 20 V, $I_F$ = 0 A, E = 0 | $I_{CEO}$ | | | 100 | 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 Ω | $f_c$ | | 100 | | kHz |
| Coupling capacitance | f = 1 MHz | $C_k$ | | 0.3 | | pF |

**Note**

- Minimum and maximum values were tested requierements. 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** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| $I_C/I_F$ | $V_{CE}$ = 5 V, $I_F$ = ± 5 mA | CTR | 20 | | 300 | % |

| MAXIMUM SAFETY RATINGS | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| **INPUT** | | | | | | |
| Forward current | | $I_F$ | | | 275 | mA |
| **OUTPUT** | | | | | | |
| Power dissipation | | $P_{diss}$ | | | 400 | mW |
| **COUPLER** | | | | | | |
| Rated impulse voltage | | $V_{IOTM}$ | | | 10 | kV |
| Safety temperature | | $T_{si}$ | | | 175 | °C |

**Note**

- According to DIN EN 60747-5-2 (VDE 0884) (see figure 2). 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 | $V_{pd}$ | 1.669 | | | kV |
| Partial discharge test voltage - lot test (sample test) | $t_{Tr}$ = 60 s, $t_{test}$ = 10 s, (see figure 2) | $V_{IOTM}$ | 10 | | | kV |
| | | $V_{pd}$ | 1.424 | | | kV |
| Insulation resistance | $V_{IO}$ = 500 V | $R_{IO}$ | $10^{12}$ | | | 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 |

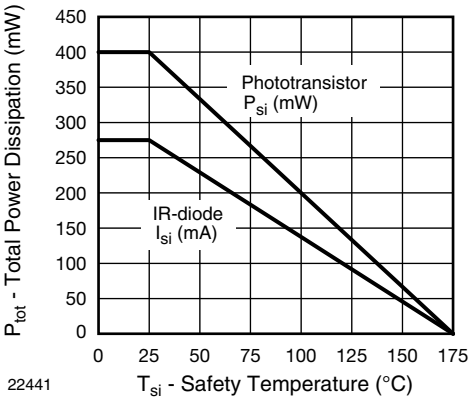



Fig. 1 - Derating Diagram

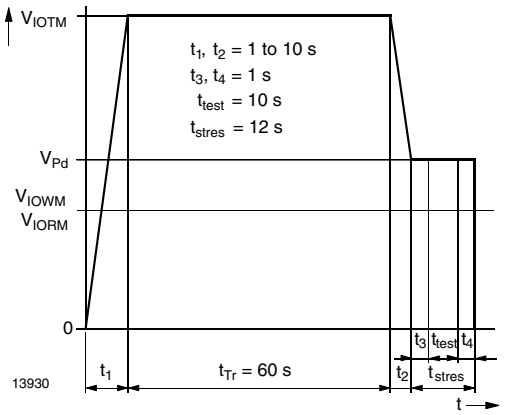



Fig. 2 - Test Pulse Diagram for Sample Test According to DIN EN 60747-5-2 (VDE 0884); IEC 60747-5-5

| SWITCHING CHARACTERISTICS | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Delay time | $V_S$ = 5 V, $I_C$ = 2 mA, $R_L$ = 100 Ω, (see figure 3) | $t_d$ | | 3 | | µs |
| Rise time | $V_S$ = 5 V, $I_C$ = 2 mA, $R_L$ = 100 Ω, (see figure 3) | $t_r$ | | 3 | | µs |
| Fall time | $V_S$ = 5 V, $I_C$ = 2 mA, $R_L$ = 100 Ω, (see figure 3) | $t_f$ | | 4.7 | | µs |
| Storage time | $V_S$ = 5 V, $I_C$ = 2 mA, $R_L$ = 100 Ω, (see figure 3) | $t_s$ | | 0.3 | | µs |
| Turn-on time | $V_S$ = 5 V, $I_C$ = 2 mA, $R_L$ = 100 Ω, (see figure 3) | $t_{on}$ | | 6 | | µs |
| Turn-off time | $V_S$ = 5 V, $I_C$ = 2 mA, $R_L$ = 100 Ω, (see figure 3) | $t_{off}$ | | 5 | | µs |
| Turn-on time | $V_S$ = 5 V, $I_F$ = 10 mA, $R_L$ = 1 kΩ, (see figure 4) | $t_{on}$ | | 9 | | µs |
| Turn-off time | $V_S$ = 5 V, $I_F$ = 10 mA, $R_L$ = 1 kΩ, (see figure 4) | $t_{off}$ | | 10 | | µs |

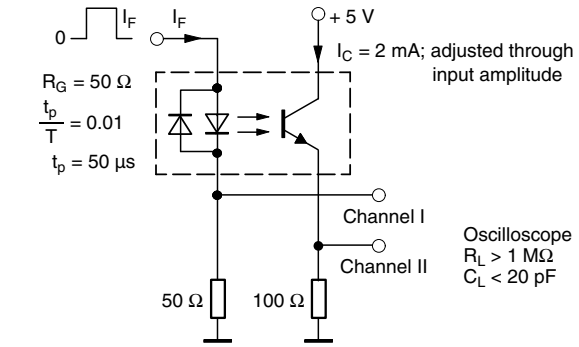



Fig. 3 - Test Circuit, Non-Saturated Operation

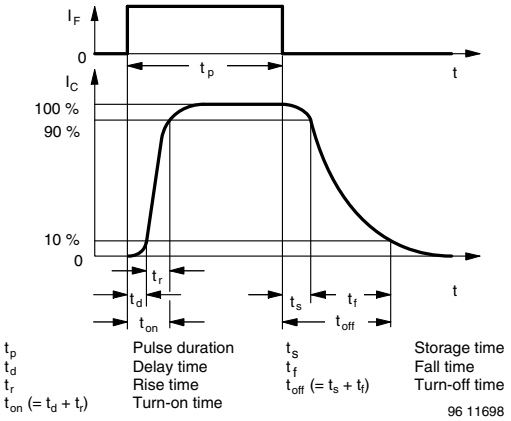



Fig. 5 - Switching Times

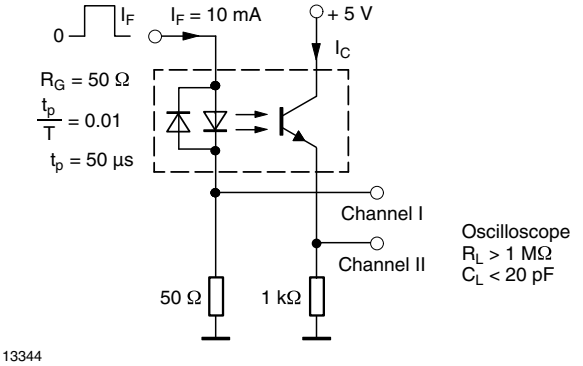



Fig. 4 - Test Circuit, Saturated Operation

**TYPICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified)

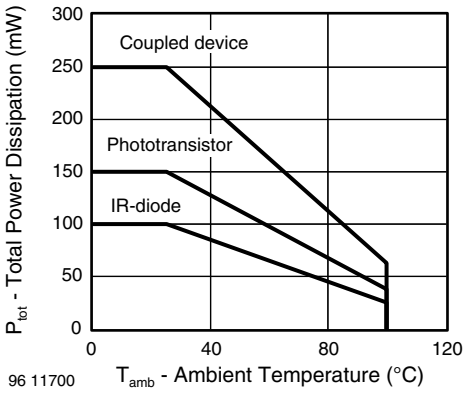



Fig. 6 - Total Power Dissipation vs. Ambient Temperature

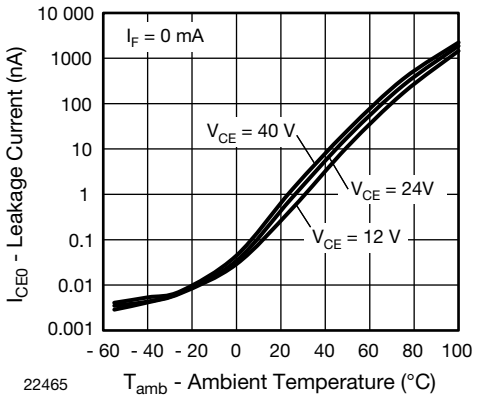



Fig. 9 - Leakage Current vs. Ambient Temperature

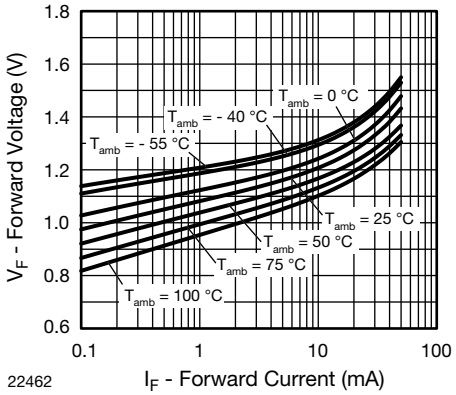



Fig. 7 - Forward Current vs. Forward Voltage

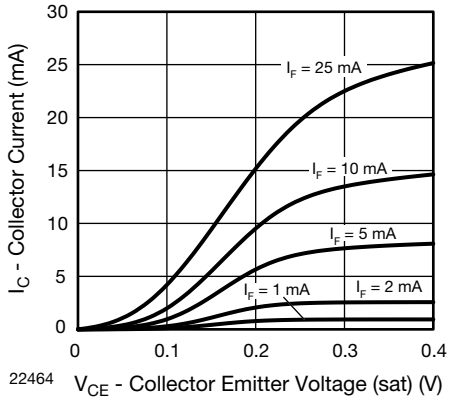



Fig. 10 - Collector Current vs. Collector Emitter Voltage (sat)

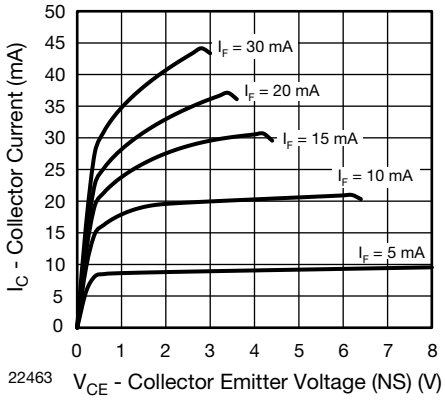



Fig. 8 - Collector Current vs. Collector Emitter Voltage (NS)

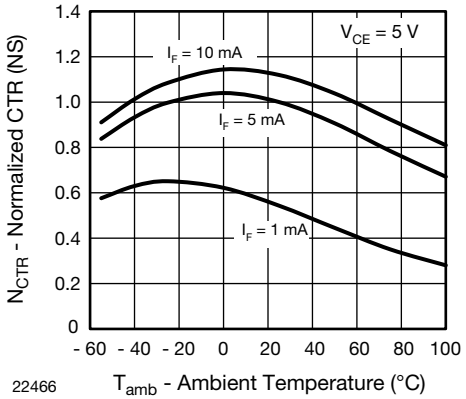



Fig. 11 - Normalized CTR (NS) vs. Ambient Temperature

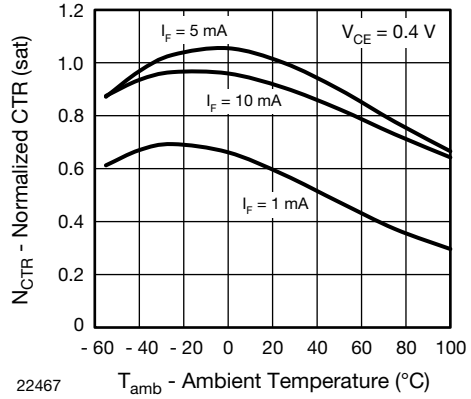



Fig. 12 - Normalized CTR (sat) vs. Ambient Temperature

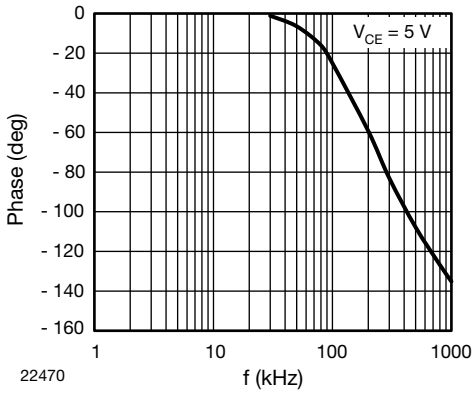



Fig. 15 - $F_{CTR}$ vs. Phase Angle

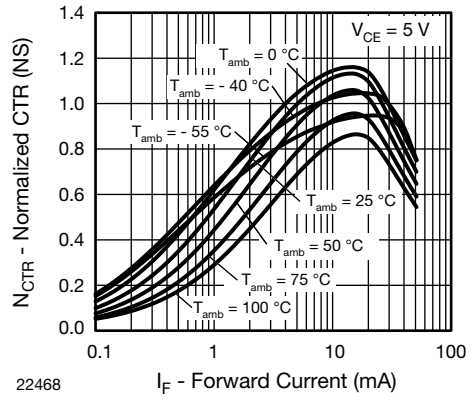



Fig. 13 - Normalized CTR (NS) vs. Forward Current

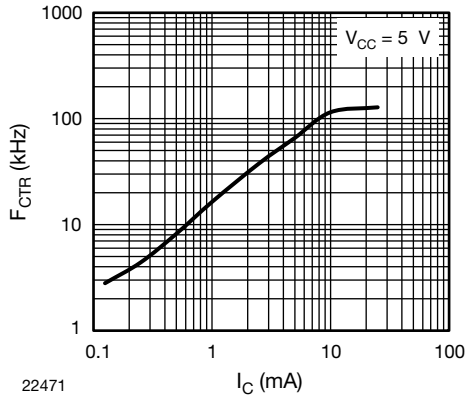



Fig. 16 - $F_{CTR}$ vs. $I_C$

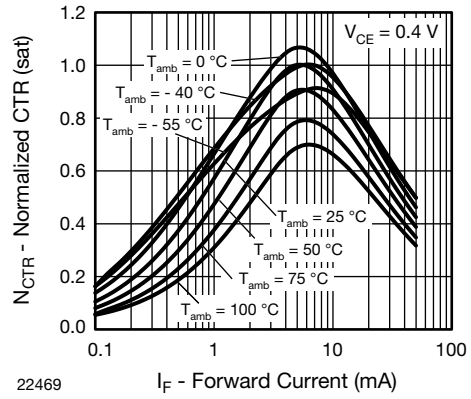



Fig. 14 - Normalized CTR (sat) vs. Forward Current

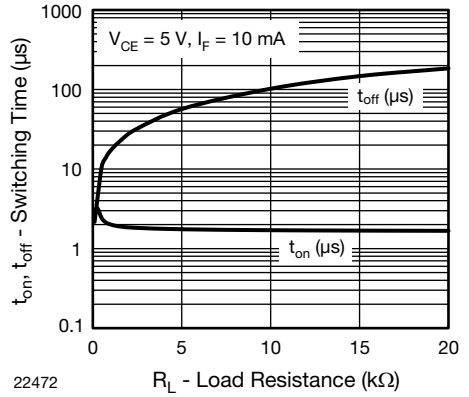
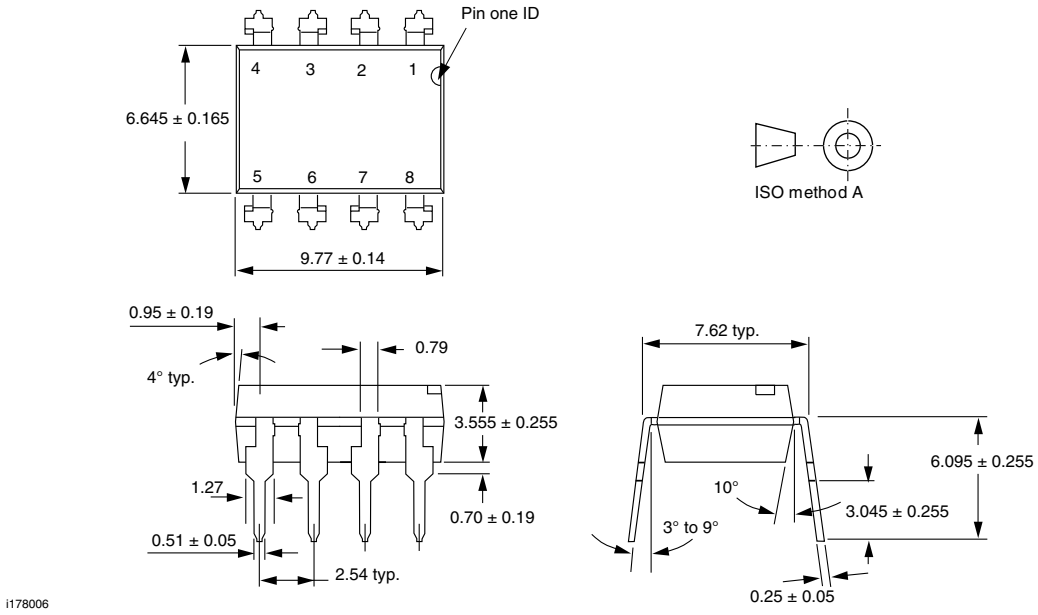
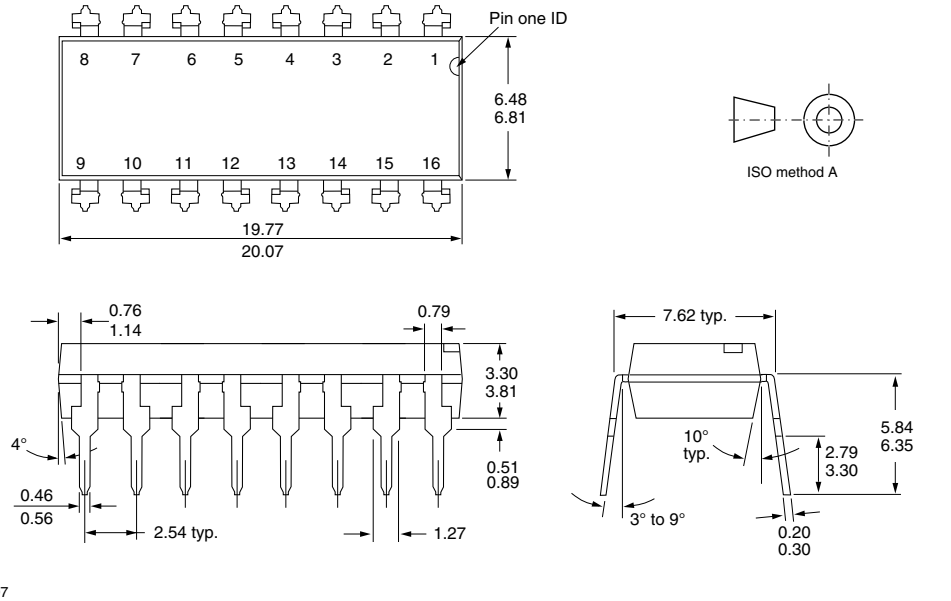


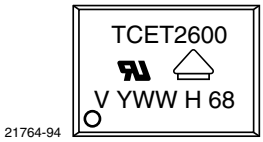

Fig. 17 - Switching Time vs. Load Resistance

## PACKAGE DIMENSIONS in millimeters




## PACKAGE MARKING



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- Поставка сложных, дефицитных, либо снятых с производства позиций;
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- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
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- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
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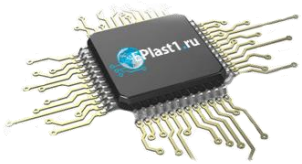
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.




**Как с нами связаться**

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