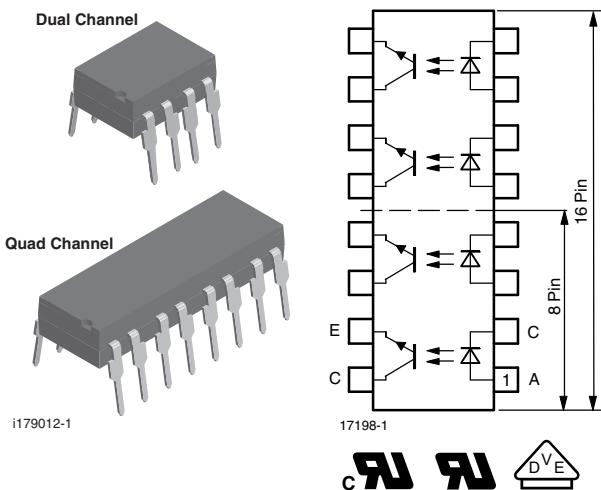


Optocoupler, Phototransistor Output, (Dual, Quad Channel)



DESCRIPTION

The TCET2100/TCET4100 consists of a phototransistor optically coupled to a gallium arsenide infrared-emitting diode, available in 8 pin (dual channel) and 16 pin (quad channel) package.

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
- Creepage current resistance according to VDE 0303/IEC 60112 comparative tracking index: $CTI \geq 175$
- Thickness through insulation ≥ 0.4 mm
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC


RoHS
COMPLIANT

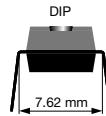
AGENCY APPROVALS

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

ORDERING INFORMATION

| | | | | | | | |
|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| <input type="checkbox"/> T | <input type="checkbox"/> C | <input type="checkbox"/> E | <input type="checkbox"/> T | <input type="checkbox"/> # | <input type="checkbox"/> 1 | <input type="checkbox"/> 0 | <input type="checkbox"/> 0 |
|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|

PART NUMBER



| AGENCY CERTIFIED/PACKAGE | CTR (%) |
|--------------------------|-----------|
| UL, cUL, VDE | 50 to 600 |
| DIP-8, dual channel | TCET2100 |
| DIP-16, quad channel | TCET4100 |

ABSOLUTE MAXIMUM RATINGS⁽¹⁾ ($T_{amb} = 25^\circ\text{C}$, 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 | $t_p \leq 10 \mu\text{s}$ | I_{FSM} | 1.5 | A |
| Power dissipation | | P_{diss} | 100 | mW |
| Junction temperature | | T_j | 125 | °C |
| OUTPUT | | | | |
| Collector emitter voltage | | V_{CEO} | 70 | V |
| Emitter collector voltage | | V_{ECO} | 7 | V |
| Collector current | | I_C | 50 | mA |
| Collector peak current | $t_p/T = 0.5, t_p \leq 10 \text{ ms}$ | I_{CM} | 100 | mA |
| Power dissipation | | P_{diss} | 150 | mW |
| Junction temperature | | T_j | 125 | °C |
| COUPLER | | | | |
| Isolation test voltage (RMS) | $t = 1 \text{ s}$ | 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, $t \leq 10 \text{ s}$ | 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 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 ($T_{amb} = 25^\circ\text{C}$, unless otherwise specified)

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|--------------------------------------|---|-------------|------|------|------|------|
| INPUT | | | | | | |
| Forward voltage | $I_F = \pm 50 \text{ mA}$ | V_F | | 1.25 | 1.6 | V |
| Junction capacitance | $V_R = 0 \text{ V}, f = 1 \text{ MHz}$ | C_j | | 50 | | pF |
| OUTPUT | | | | | | |
| Collector emitter voltage | $I_C = 1 \text{ mA}$ | V_{CEO} | 70 | | | V |
| Emitter collector voltage | $I_E = 100 \mu\text{A}$ | V_{ECO} | 7 | | | V |
| Collector emitter cut-off current | $V_{CE} = 20 \text{ V}, I_F = 0, E = 0$ | I_{CEO} | | 10 | 100 | nA |
| COUPLER | | | | | | |
| Collector emitter saturation voltage | $I_F = 10 \text{ mA}, I_C = 1 \text{ mA}$ | V_{CEsat} | | | 0.3 | V |
| Cut-off frequency | $V_{CE} = 5 \text{ V}, I_F = 10 \text{ mA}, R_L = 100 \Omega$ | f_c | | 110 | | kHz |
| Coupling capacitance | $f = 1 \text{ MHz}$ | C_k | | 0.3 | | pF |

Note

- 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 | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|-----------|--|--------|------|------|------|------|
| I_C/I_F | $V_{CE} = 5 \text{ V}, I_F = 5 \text{ mA}$ | CTR | 50 | | 600 | % |

MAXIMUM SAFETY RATINGS

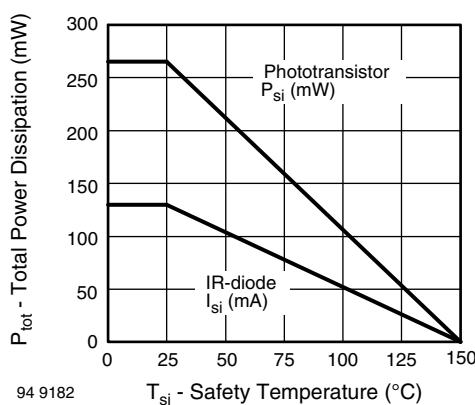
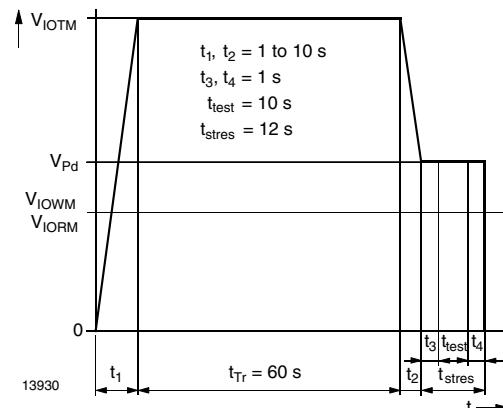
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|-----------------------|----------------|------------|------|------|------|------|
| INPUT | | | | | | |
| Forward current | | I_F | | | 275 | mA |
| OUTPUT | | | | | | |
| Power dissipation | | P_{diss} | | | 400 | mW |
| COUPLER |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

Note

- According to DIN EN 60747-5-5 (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 60747-5-5/DIN EN 60747-1/IEC60747

SWITCHING CHARACTERISTICS

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

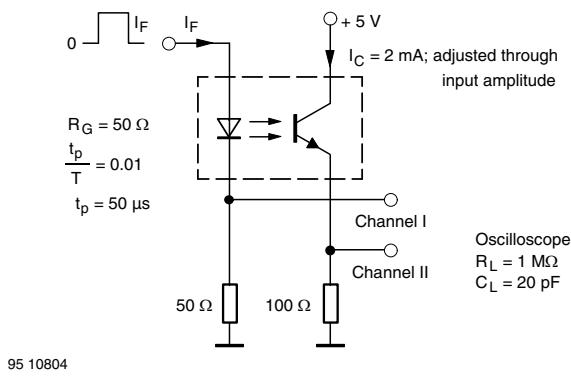


Fig. 3 - Test Circuit, Non-Saturated Operation

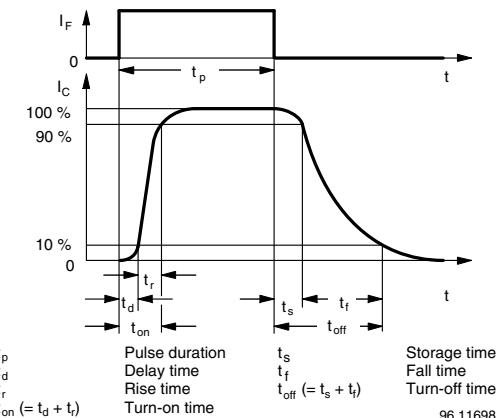


Fig. 5 - Switching Times

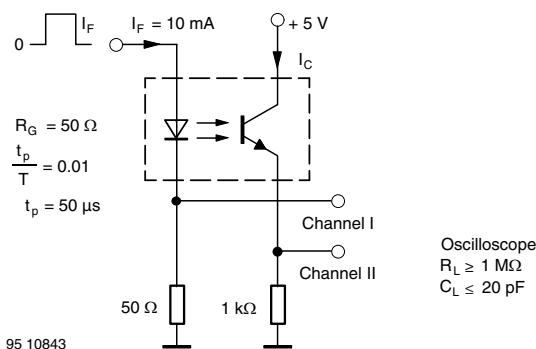


Fig. 4 - Test Circuit, Saturated Operation

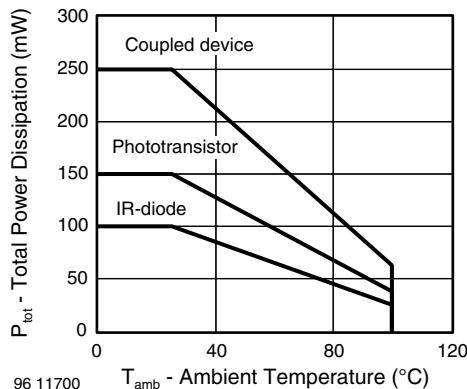
TYPICAL CHARACTERISTICS ($T_{amb} = 25$ °C, unless otherwise specified)


Fig. 6 - Total Power Dissipation vs. Ambient Temperature

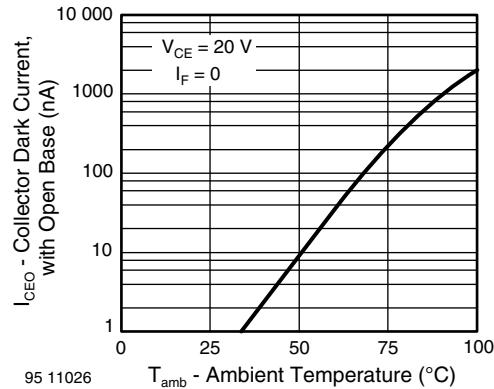


Fig. 9 - Collector Dark Current vs. Ambient Temperature

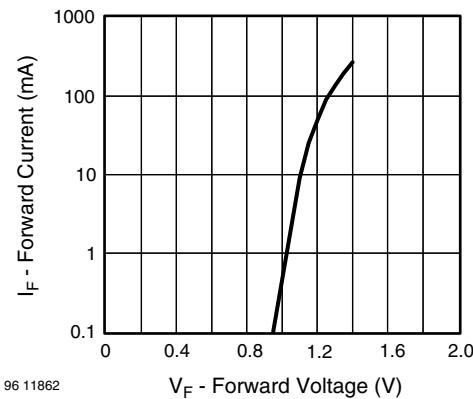


Fig. 7 - Forward Current vs. Forward Voltage

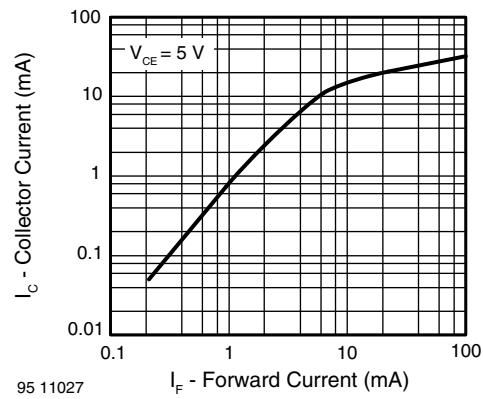


Fig. 10 - Collector Current vs. Forward Current

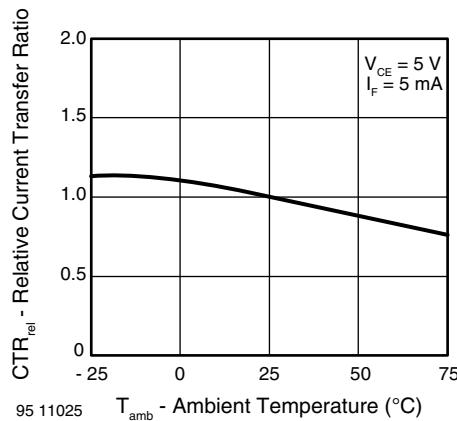


Fig. 8 - Relative Current Transfer Ratio vs. Ambient Temperature

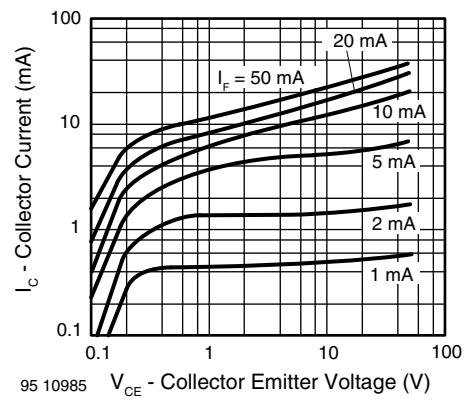


Fig. 11 - Collector Current vs. Collector Emitter Voltage

TCET2100, TCET4100

Vishay Semiconductors Optocoupler, Phototransistor Output,
(Dual, Quad Channel)

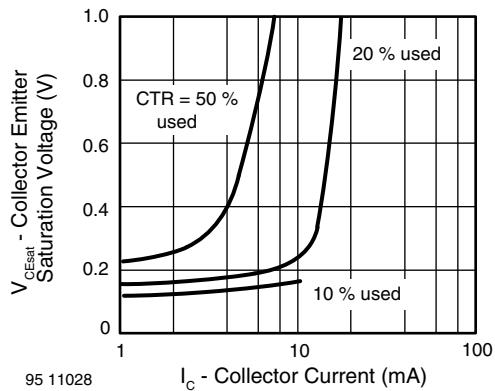


Fig. 12 - Collector Emitter Saturation Voltage vs. Collector Current

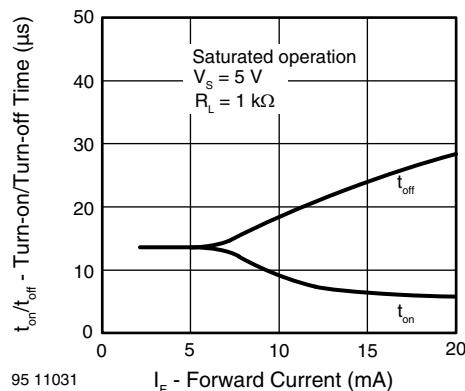


Fig. 15 - Turn-on/off Time vs. Forward Current

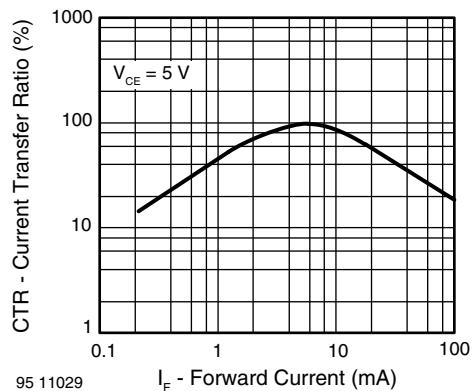


Fig. 13 - Current Transfer Ratio vs. Forward Current

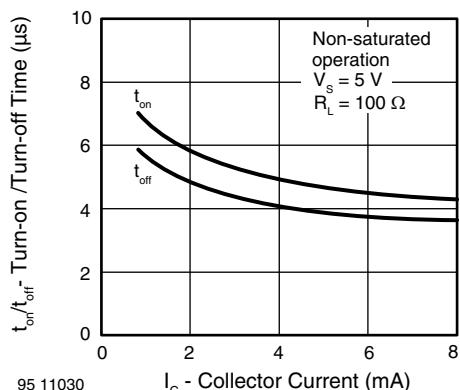
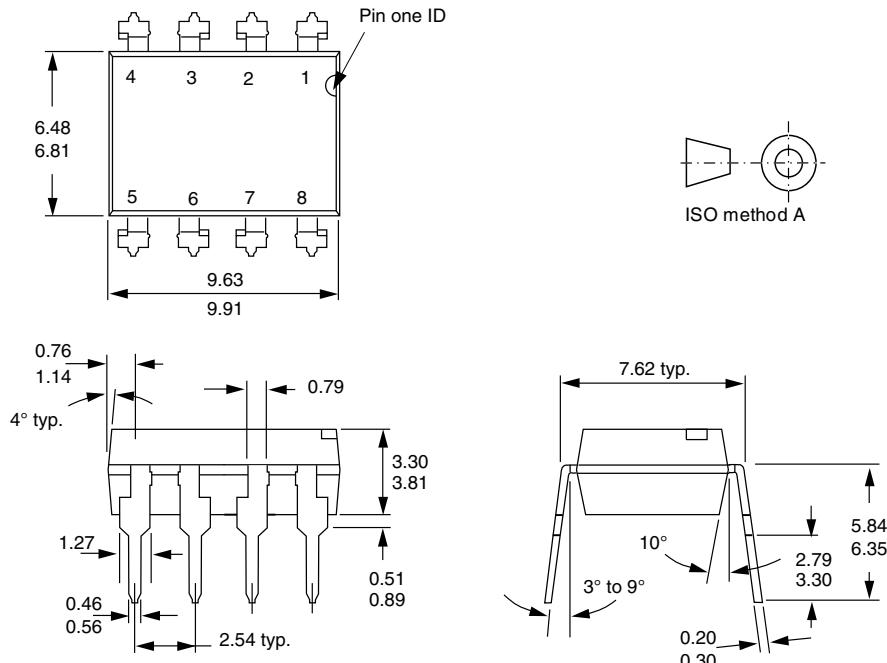


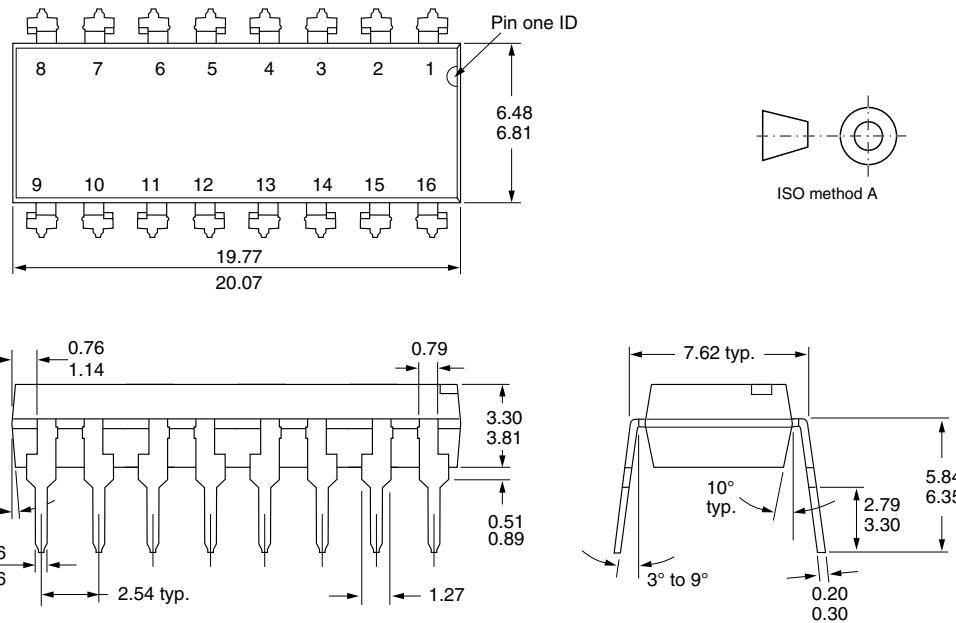
Fig. 14 - Turn-on/off Time vs. Collector Current

Optocoupler, Phototransistor Output, Vishay Semiconductors (Dual, Quad Channel)

PACKAGE DIMENSIONS in millimeters

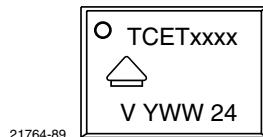


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PACKAGE MARKING



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