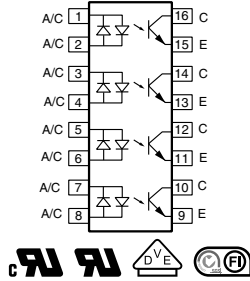
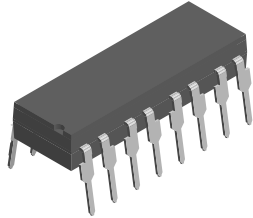


## Optocoupler, Phototransistor Output, AC Input (Quad Channel)



### LINKS TO ADDITIONAL RESOURCES



**SPICE**  
Models

### DESCRIPTION

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

### FEATURES

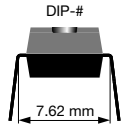
- Extra low coupling capacity - typical 0.2 pF
- High common mode rejection
- Low temperature coefficient of CTR
- Rated impulse voltage (transient overvoltage)  $V_{IOTM} = 10$  kV peak
- Isolation test voltage (partial discharge test voltage)  $V_{pd} = 1.6$  kV peak
- Rated isolation voltage (RMS includes DC)  $V_{IOWM} = 600$  V<sub>RMS</sub>
- Rated recurring peak voltage (repetitive)  $V_{IORM} = 890$  V<sub>peak</sub>
- Thickness through insulation  $\geq 0.4$  mm
- Creepage current resistance according to VDE 0303 / IEC 60112 comparative tracking index: CTI  $\geq 175$
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

### AGENCY APPROVALS

- [UL / cUL](#) 1577
- [DIN EN 60747-5-5 \(VDE 0884\)](#)
- [FIMKO](#)

ORDERING INFORMATION	
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin: 2px;">T</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">C</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">E</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">T</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">4</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">6</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">0</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">0</div> </div> <p style="text-align: center; margin-top: 5px;">PART NUMBER</p>	
<b>AGENCY CERTIFIED / PACKAGE</b>	<b>CTR (%)</b>
	<b>± 5 mA</b>
<b>UL, cUL, VDE, FIMKO</b>	<b>20 to 300</b>
DIP-16, quad channel	TCET4600



ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		$V_R$	6	V
Forward current		$I_F$	$\pm 60$	mA
Forward surge current	$t_p \leq 10\text{ }\mu\text{s}$	$I_{FSM}$	$\pm 1.5$	A
Power dissipation		$P_{diss}$	100	mW
Junction temperature		$T_j$	125	$^{\circ}\text{C}$
<b>OUTPUT</b>				
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	$^{\circ}\text{C}$
<b>COUPLER</b>				
Total power dissipation		$P_{tot}$	250	mW
Operating ambient temperature range		$T_{amb}$	-55 to +100	$^{\circ}\text{C}$
Storage temperature range		$T_{stg}$	-55 to +150	$^{\circ}\text{C}$
Soldering temperature <sup>(1)</sup>	2 mm from case, $t \leq 10\text{ s}$	$T_{sld}$	260	$^{\circ}\text{C}$

**Notes**

- 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

<sup>(1)</sup> Refer to wave profile for soldering conditions for through hole devices

ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
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
<b>OUTPUT</b>						
Collector emitter voltage	$I_C = 100\text{ }\mu\text{A}$	$V_{CEO}$	70	-	-	V
Emitter collector voltage	$I_E = 100\text{ }\mu\text{A}$	$V_{ECO}$	7	-	-	V
Collector dark current	$V_{CE} = 20\text{ V}, I_F = 0\text{ A}, E = 0$	$I_{CEO}$	-	-	100	nA
<b>COUPLER</b>						
Collector emitter saturation voltage	$I_F = 10\text{ mA}, I_C = 1\text{ mA}$	$V_{CEsat}$	-	-	0.3	V
Cut-off frequency	$V_{CE} = 5\text{ V}, I_F = 10\text{ mA}, R_L = 100\text{ }\Omega$	$f_c$	-	100	-	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
$I_C/I_F$	$V_{CE} = 5\text{ V}, I_F = \pm 5\text{ mA}$	CTR	20	-	300	%



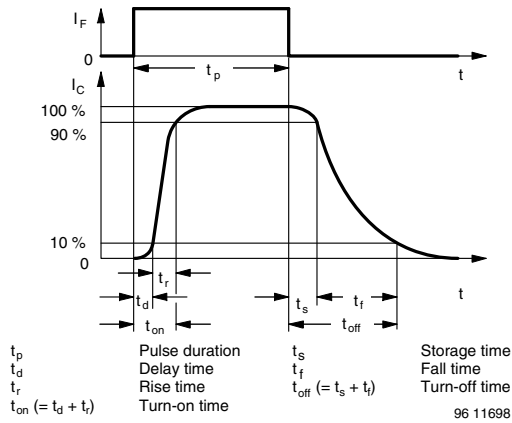


Fig. 5 - Switching Times

SAFETY AND INSULATION RATINGS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	According to IEC 68 part 1		55 / 100 / 21	
Comparative tracking index		CTI	175	
Maximum rated withstanding isolation voltage	$t = 1 \text{ min}$	$V_{ISO}$	4420	$V_{RMS}$
Maximum transient isolation voltage		$V_{IOTM}$	10 000	$V_{peak}$
Maximum repetitive peak isolation voltage		$V_{IORM}$	890	$V_{peak}$
Isolation resistance	$V_{IO} = 500 \text{ V}, T_{amb} = 25 \text{ }^\circ\text{C}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$V_{IO} = 500 \text{ V}, T_{amb} = 100 \text{ }^\circ\text{C}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
	$V_{IO} = 500 \text{ V}, T_{amb} = 150 \text{ }^\circ\text{C}$ (construction test only)	$R_{IO}$	$\geq 10^9$	$\Omega$
Output safety power		$P_{SO}$	400	mW
Input safety current		$I_{SI}$	275	mA
Safety temperature		$T_S$	175	$^\circ\text{C}$
Creepage distance	Standard DIP-16		$\geq 7$	mm
Clearance distance	Standard DIP-16		$\geq 7$	mm
Creepage distance	400 mil DIP-16		$\geq 8$	mm
Clearance distance	400 mil DIP-16		$\geq 8$	mm
Insulation thickness		DTI	$\geq 0.4$	mm
Partial discharge test voltage - routine test	100 %, $t_{test} = 1 \text{ s}$	$V_{pd}$	1.669	$\text{kV}_{peak}$
Partial discharge test voltage - lot test (sample test)	$t_{Tr} = 60 \text{ s}, t_{test} = 10 \text{ s}$ , (see Fig. 2)	$V_{pd}$	1.424	$\text{kV}_{peak}$

**Note**

- As per IEC 60747-5-5, § 7.4.3.8.2, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits

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

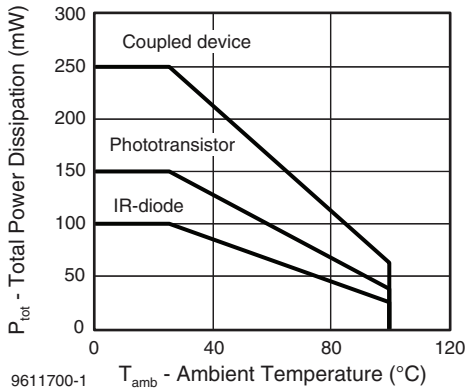


Fig. 6 - Total Power Dissipation vs. Ambient Temperature

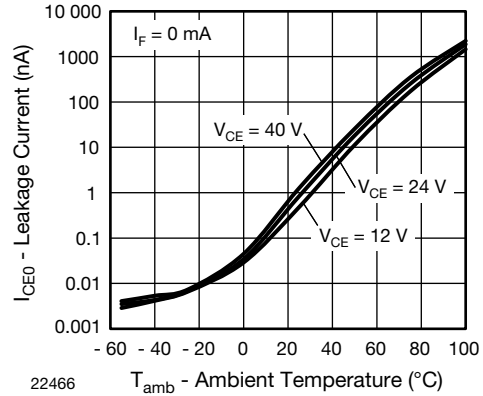


Fig. 9 - Leakage Current vs. Ambient Temperature

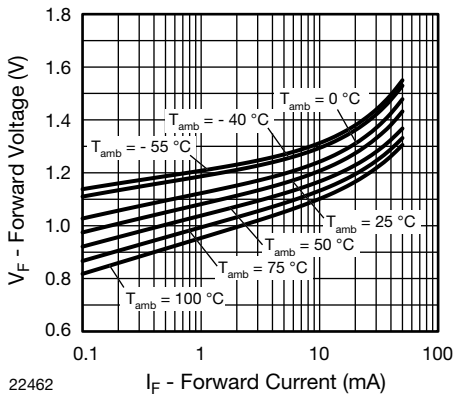


Fig. 7 - Forward Current vs. Forward Voltage

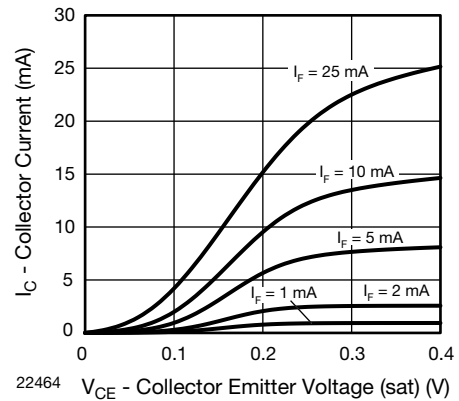


Fig. 10 - Collector Current vs. Collector Emitter Voltage (saturated)

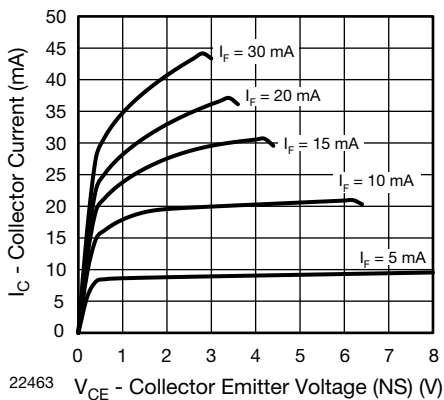


Fig. 8 - Collector Current vs. Collector Emitter Voltage (non-saturated)

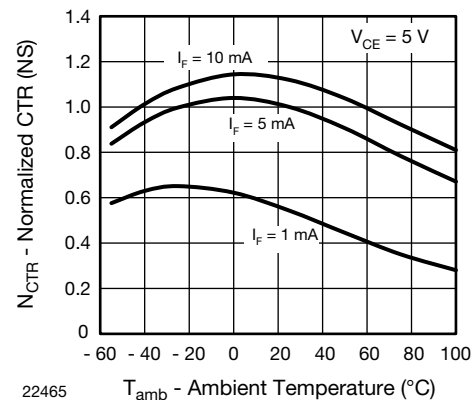


Fig. 11 - Normalized CTR (non-saturated) vs. Ambient Temperature

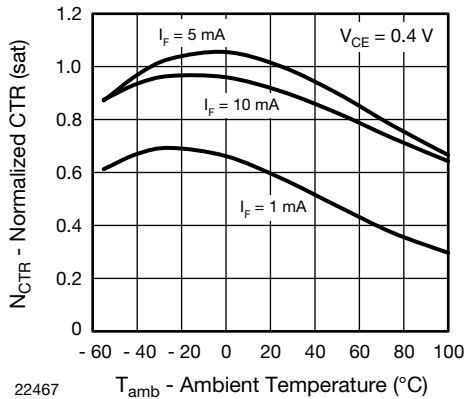


Fig. 12 - Normalized CTR (saturated) vs. Ambient Temperature

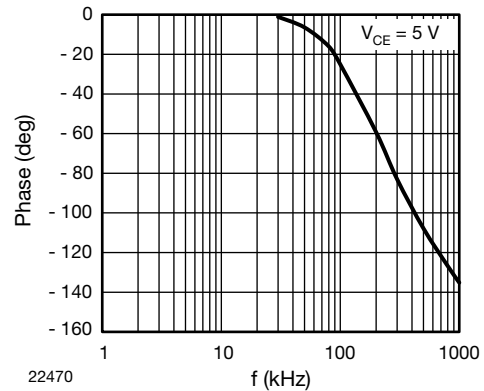


Fig. 15 -  $F_{CTR}$  vs. Phase Angle

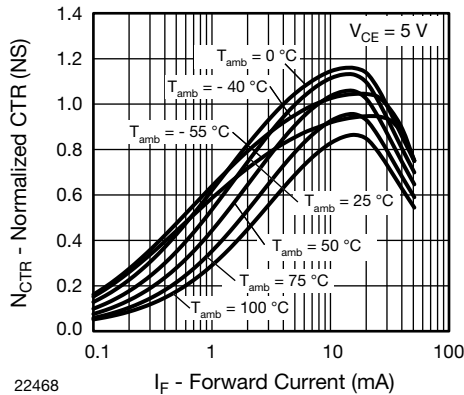


Fig. 13 - Normalized CTR (non-saturated) vs. Forward Current

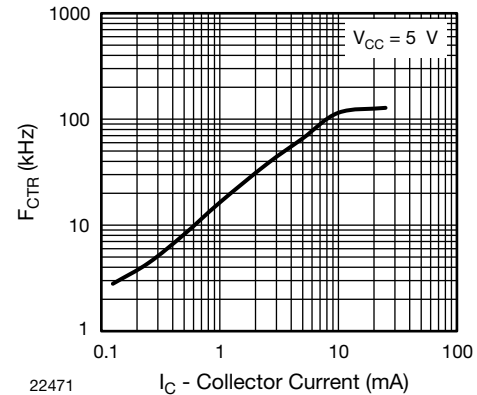


Fig. 16 -  $F_{CTR}$  vs.  $I_C$

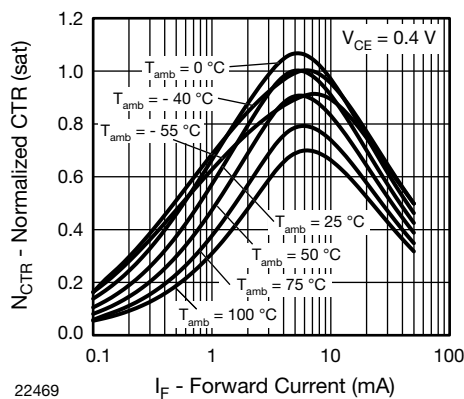


Fig. 14 - Normalized CTR (saturated) vs. Forward Current

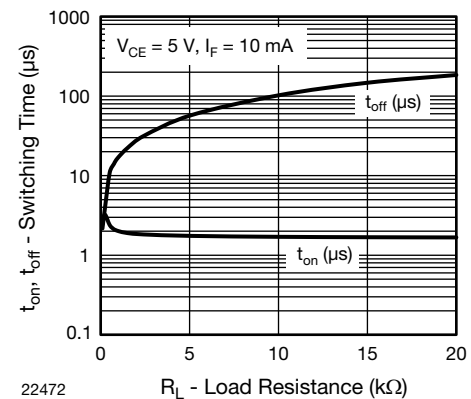
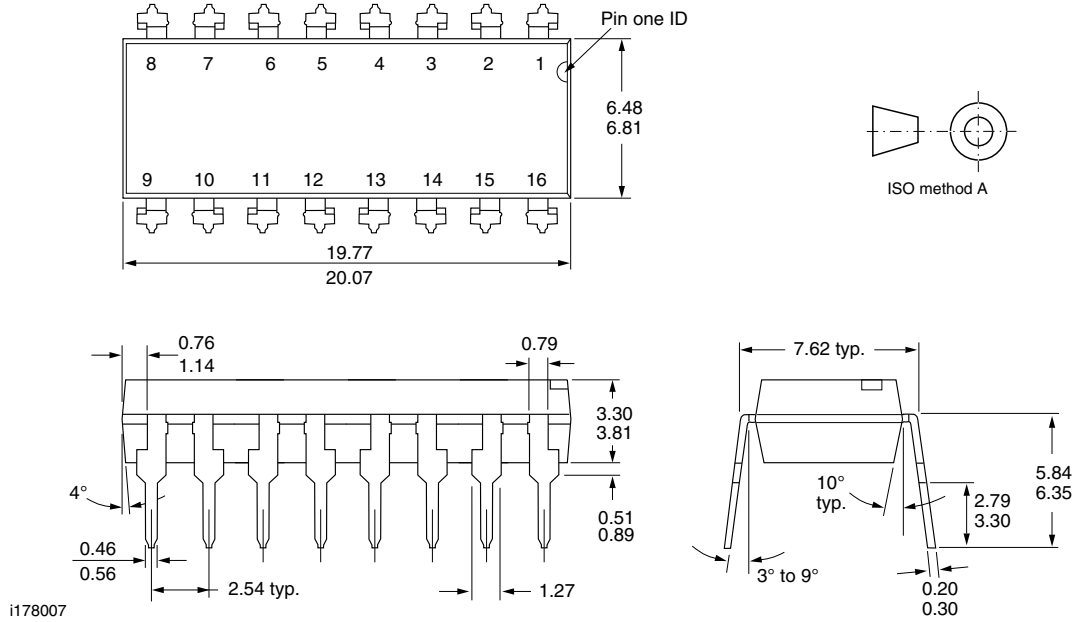


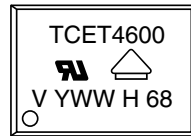
Fig. 17 - Switching Time vs. Load Resistance



**PACKAGE DIMENSIONS** in millimeters



**PACKAGE MARKING** (example)





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