



# THE DATASHEET OF TCET1100G





<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		$V_R$	6	V
Forward current		$I_F$	60	mA
Forward surge current	$t_p \leq 10\text{ }\mu\text{s}$	$I_{FSM}$	1.5	A
<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
<b>COUPLER</b>				
Isolation test voltage (RMS)	$t = 1\text{ min}$	$V_{ISO}$	5000	$V_{RMS}$
Operating ambient temperature range		$T_{amb}$	-40 to +100	$^{\circ}\text{C}$
Storage temperature range		$T_{stg}$	-55 to +125	$^{\circ}\text{C}$
Soldering temperature <sup>(1)</sup>	2 mm from case, $\leq 10\text{ s}$	$T_{slid}$	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 ratings for extended periods of the time can adversely affect reliability
- <sup>(1)</sup> Refer to wave profile for soldering conditions for through hole devices

<b>THERMAL CHARACTERISTICS</b>				
PARAMETER	SYMBOL	VALUE	UNIT	
LED power dissipation	$P_{diss}$	100	mW	<p>The diagram shows a thermal network for the device. It includes nodes for ambient temperature (<math>T_A</math>), board (<math>T_B</math>), case (<math>T_C</math>), junction detector (<math>T_{JD}</math>), and junction emitter (<math>T_{JE}</math>). Thermal resistances are indicated by resistors: <math>\theta_{CA}</math> (case to ambient), <math>\theta_{BA}</math> (board to ambient), <math>\theta_{DB}</math> (junction detector to board), <math>\theta_{DC}</math> (junction detector to case), <math>\theta_{EB}</math> (junction emitter to board), <math>\theta_{EC}</math> (junction emitter to case), <math>\theta_{ED}</math> (junction emitter to junction detector), <math>\theta_{DE}</math> (junction detector to junction emitter), and <math>\theta_{JC}</math> (junction to case).</p>
Output power dissipation	$P_{diss}$	150	mW	
Maximum LED junction temperature	$T_{jmax.}$	125	$^{\circ}\text{C}$	
Maximum output die junction temperature	$T_{jmax.}$	125	$^{\circ}\text{C}$	
Thermal resistance, junction emitter to board	$\theta_{EB}$	173	$^{\circ}\text{C}/\text{W}$	
Thermal resistance, junction emitter to case	$\theta_{EC}$	149	$^{\circ}\text{C}/\text{W}$	
Thermal resistance, junction detector to board	$\theta_{DB}$	111	$^{\circ}\text{C}/\text{W}$	
Thermal resistance, junction detector to case	$\theta_{DC}$	127	$^{\circ}\text{C}/\text{W}$	
Thermal resistance, junction emitter to junction detector	$\theta_{ED}$	173	$^{\circ}\text{C}/\text{W}$	
Thermal resistance, board to ambient <sup>(1)</sup>	$\theta_{BA}$	197	$^{\circ}\text{C}/\text{W}$	
Thermal resistance, case to ambient <sup>(1)</sup>	$\theta_{CA}$	4041	$^{\circ}\text{C}/\text{W}$	

**Notes**

- The thermal model is represented in the thermal network below. Each resistance value given in this model can be used to calculate the temperatures at each node for a given operating condition. The thermal resistance from board to ambient will be dependent on the type of PCB, layout and thickness of copper traces. For a detailed explanation of the thermal model, please reference Vishay's "Thermal Characteristics of Optocouplers" application note
- <sup>(1)</sup> For 2 layer FR4 board (4" x 3" x 0.062")



<b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Forward voltage	$I_F = 50\text{ mA}$	$V_F$	-	1.25	1.6	V
Junction capacitance	$V_R = 0, f = 1\text{ MHz}$	$C_j$	-	50	-	pF
<b>OUTPUT</b>						
Collector emitter voltage	$I_C = 1\text{ mA}$	$V_{CEO}$	70	-	-	V
Emitter collector voltage	$I_E = 100\text{ }\mu\text{A}$	$V_{ECO}$	7	-	-	V
Collector emitter cut-off current	$V_{CE} = 20\text{ V}, I_F = 0\text{ A}, E = 0$	$I_{CEO}$	-	10	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	$V_{CE} = 5\text{ V}, I_F = 10\text{ mA}, R_L = 100\text{ }\Omega$	$f_c$	-	110	-	kHz
Coupling capacitance	$f = 1\text{ MHz}$	$C_k$	-	0.3	-	pF

**Note**

- 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

<b>CURRENT TRANSFER RATIO</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
$I_C/I_F$	$V_{CE} = 5\text{ V}, I_F = 1\text{ mA}$	TCET1101G	CTR	13	30	-	%
		TCET1102, TCET1102G	CTR	22	45	-	%
		TCET1103, TCET1103G	CTR	34	70	-	%
		TCET1104G	CTR	56	90	-	%
	$V_{CE} = 5\text{ V}, I_F = 5\text{ mA}$	TCET1100, TCET1100G	CTR	50	-	600	%
		TCET1106, TCET1106G	CTR	100	-	300	%
		TCET1107, TCET1107G	CTR	80	-	160	%
		TCET1108, TCET1108G	CTR	130	-	260	%
		TCET1109, TCET1109G	CTR	200	-	400	%
	$V_{CE} = 5\text{ V}, I_F = 10\text{ mA}$	TCET1101, TCET1101G	CTR	40	-	80	%
		TCET1102, TCET1102G	CTR	63	-	125	%
		TCET1103, TCET1103G	CTR	100	-	200	%
		TCET1104, TCET1104G	CTR	160	-	320	%

MAXIMUM SAFETY RATINGS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Forward current		$I_F$	-	-	130	mA
<b>OUTPUT</b>						
Power dissipation		$P_{diss}$	-	-	265	mW
<b>COUPLER</b>						
Rated impulse voltage		$V_{IOTM}$	-	-	6	kV
Safety temperature		$T_{si}$	-	-	150	°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	$V_{pd}$	1.6	-	-	kV
Partial discharge test voltage - lot test (sample test)	$t_{Tr} = 60$ s, $t_{test} = 10$ s, (see figure 2)	$V_{IOTM}$	6	-	-	kV
		$V_{pd}$	1.3	-	-	kV
Insulation resistance	$V_{IO} = 500$ V	$R_{IO}$	$10^{12}$	-	-	$\Omega$
	$V_{IO} = 500$ V, $T_{amb} = 100$ °C	$R_{IO}$	$10^{11}$	-	-	$\Omega$
	$V_{IO} = 500$ V, $T_{amb} = 150$ °C (construction test only)	$R_{IO}$	$10^9$	-	-	$\Omega$

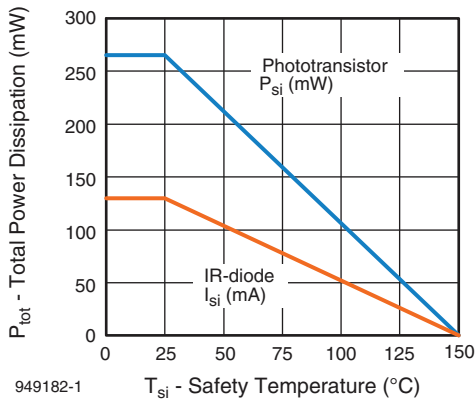


Fig. 1 - Derating Diagram

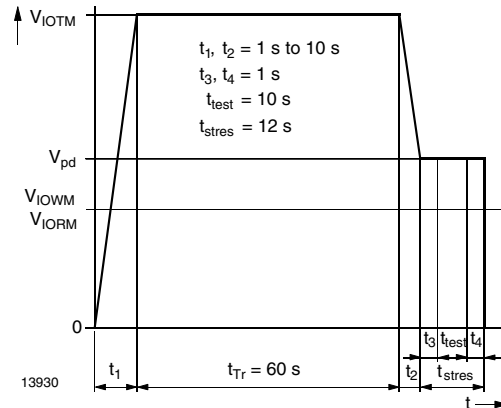


Fig. 2 - Test Pulse Diagram for Sample Test According to DIN EN 60747-5-5 / DIN EN 60747-; IEC 60747

SWITCHING CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Delay time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\ \Omega$ , (see Fig. 3)	$t_d$	-	3	-	$\mu\text{s}$
Rise time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\ \Omega$ , (see Fig. 3)	$t_r$	-	3	-	$\mu\text{s}$
Turn-on time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\ \Omega$ , (see Fig. 3)	$t_{on}$	-	6	-	$\mu\text{s}$
Storage time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\ \Omega$ , (see Fig. 3)	$t_s$	-	0.3	-	$\mu\text{s}$
Fall time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\ \Omega$ , (see Fig. 3)	$t_f$	-	4.7	-	$\mu\text{s}$
Turn-off time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\ \Omega$ , (see Fig. 3)	$t_{off}$	-	5	-	$\mu\text{s}$
Turn-on time	$V_S = 5\text{ V}$ , $I_F = 10\text{ mA}$ , $R_L = 1\text{ k}\Omega$ , (see Fig. 4)	$t_{on}$	-	9	-	$\mu\text{s}$
Turn-off time	$V_S = 5\text{ V}$ , $I_F = 10\text{ mA}$ , $R_L = 1\text{ k}\Omega$ , (see Fig. 4)	$t_{off}$	-	10	-	$\mu\text{s}$

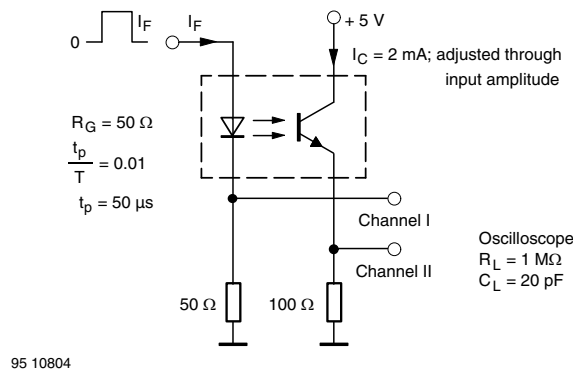


Fig. 3 - Test Circuit, Non-Saturated Operation

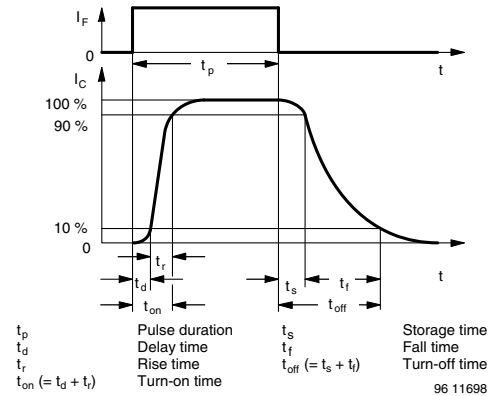


Fig. 5 - Switching Times

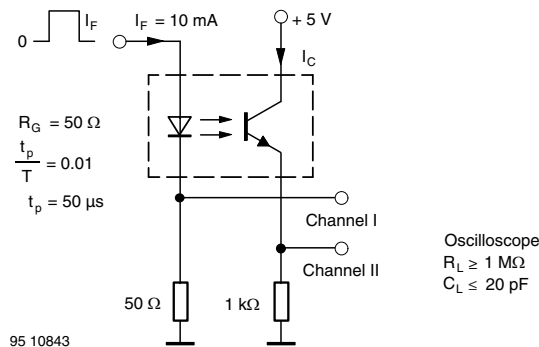


Fig. 4 - Test Circuit, Saturated Operation



TYPICAL CHARACTERISTICS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

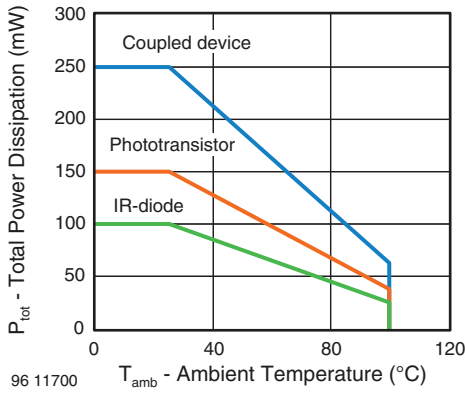


Fig. 6 - Total Power Dissipation vs. Ambient Temperature

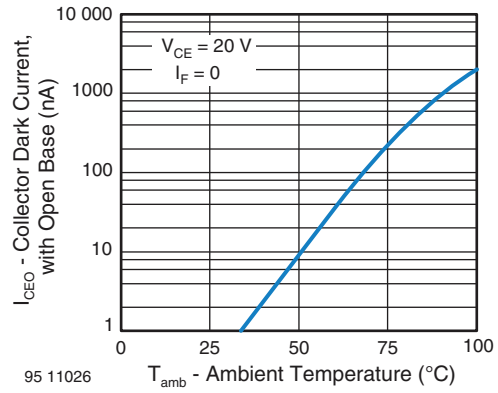


Fig. 9 - Collector Dark Current vs. Ambient Temperature

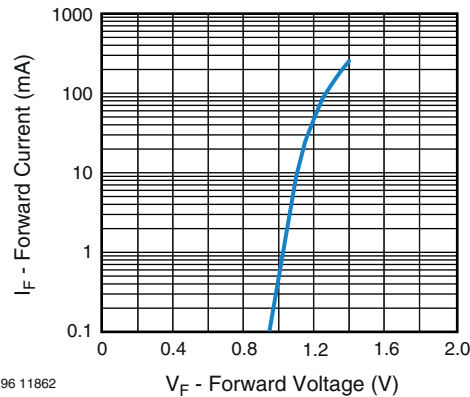


Fig. 7 - Forward Current vs. Forward Voltage

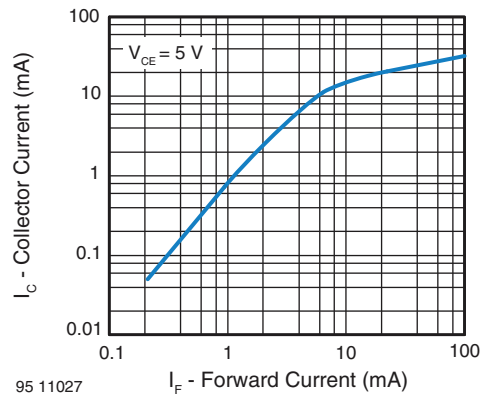


Fig. 10 - Collector Current vs. Forward Current

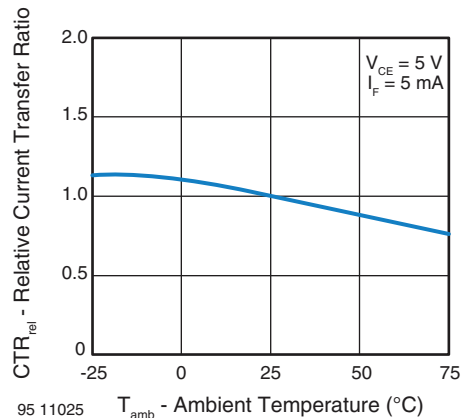


Fig. 8 - Relative Current Transfer Ratio vs. Ambient Temperature

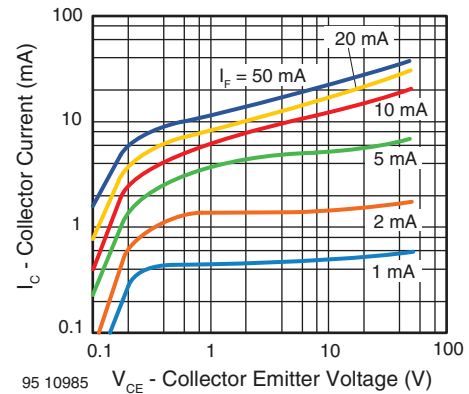


Fig. 11 - Collector Current vs. Collector Emitter Voltage

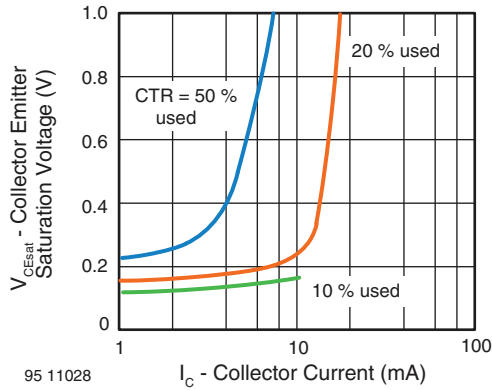


Fig. 12 - Collector Emitter Saturation Voltage vs. Collector Current

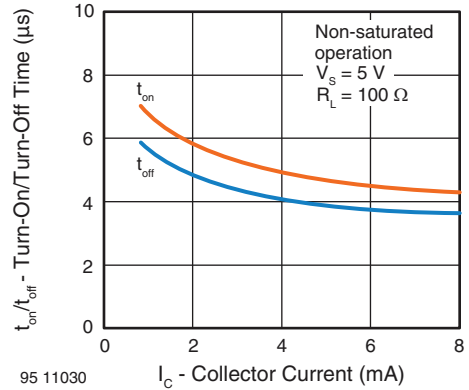


Fig. 14 - Turn-On / Off Time vs. Collector Current

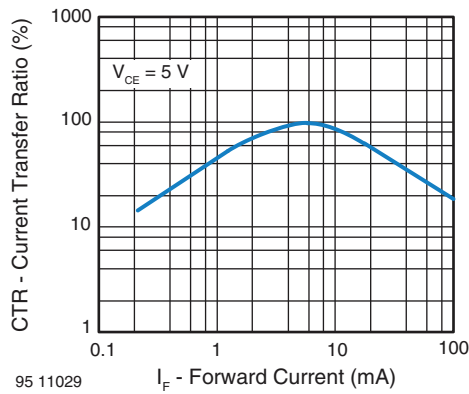


Fig. 13 - Current Transfer Ratio vs. Forward Current

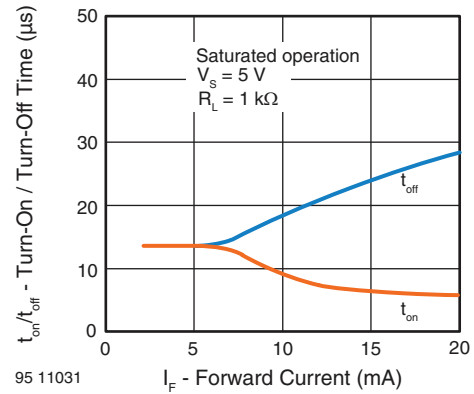
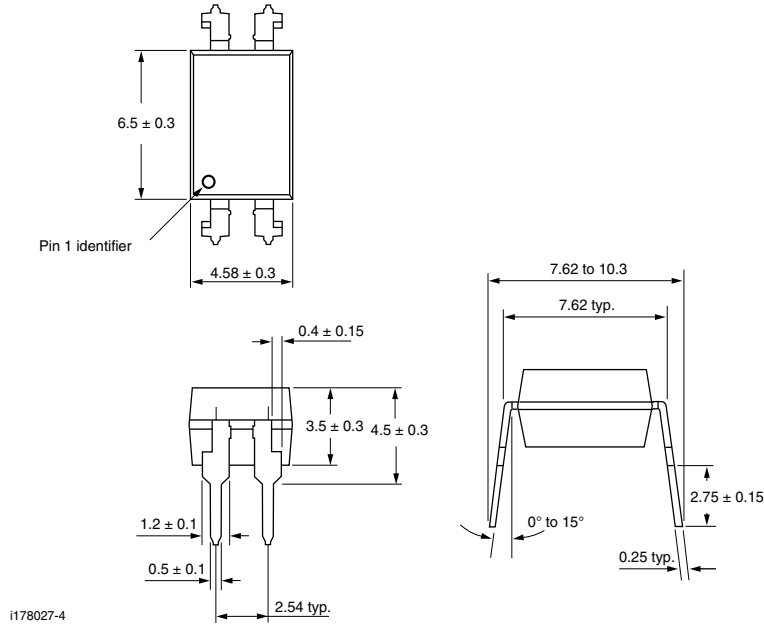


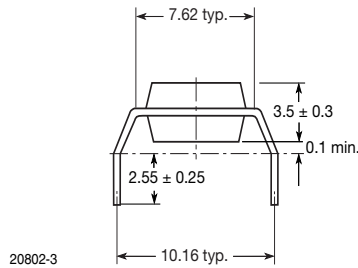
Fig. 15 - Turn-On / Off Time vs. Forward Current



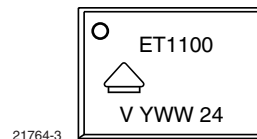
## PACKAGE DIMENSIONS in millimeters



### TCET1100G type



## PACKAGE MARKING





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