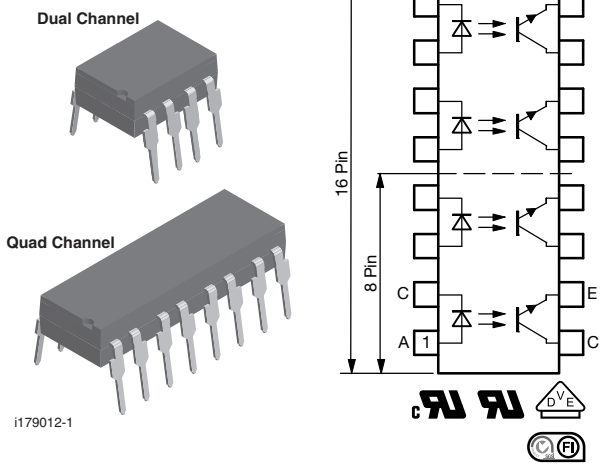
Optocoupler, Phototransistor Output, (Dual, Quad Channel)



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
- Creepage current resistance according to VDE 0303 / IEC 60112 comparative tracking index: CTI ≥ 175
- Thickness through insulation ≥ 0.4 mm
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

AGENCY APPROVALS

- UL
- cUL
- DIN EN 60747-5-5 (VDE 0884)
- FIMKO

LINKS TO ADDITIONAL RESOURCES

Product Page

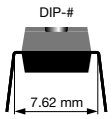
DESCRIPTION

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.

ORDERING INFORMATION

T	C	E	T	#	1	0	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 (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
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				
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 [1]	2 mm from case, t ≤ 10 s	T_{sld}	260	°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.

(1) Refer to wave profile for soldering conditions for through hole devices.

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
Forward voltage	$I_F = \pm 50$ 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	$I_C = 1$ mA	V_{CEO}	70	-	-	V
Emitter collector voltage	$I_E = 100$ µA	V_{ECO}	7	-	-	V
Collector emitter cut-off current	$V_{CE} = 20$ V, $I_F = 0$, E = 0	I_{CEO}	-	10	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	-	110	-	kHz
Coupling capacitance	f = 1 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	$V_{CE} = 5$ V, $I_F = 5$ mA	CTR	50	-	600	%

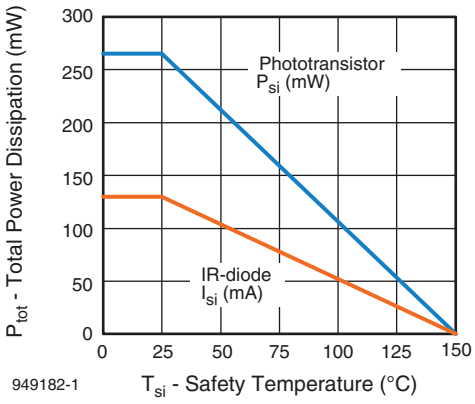


Fig. 1 - Derating Diagram

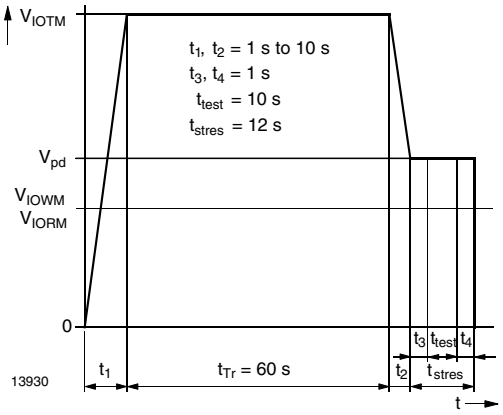


Fig. 2 - Test Pulse Diagram for Sample Test According to DIN EN 60747-5-5/DIN EN 60747-; IEC60747

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

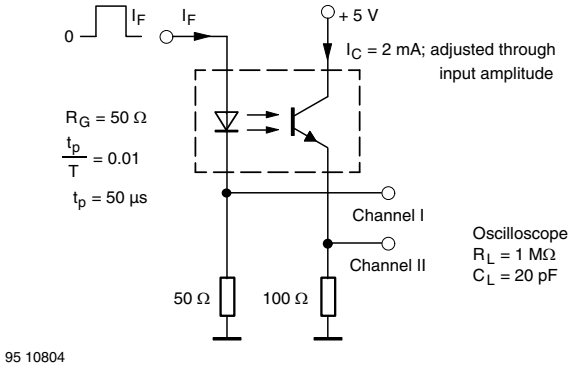


Fig. 3 - Test Circuit, Non-Saturated Operation

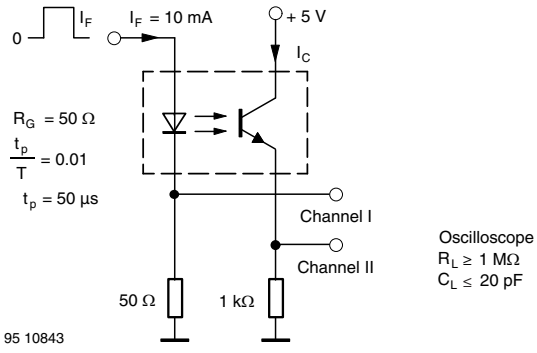


Fig. 4 - Test Circuit, Saturated Operation

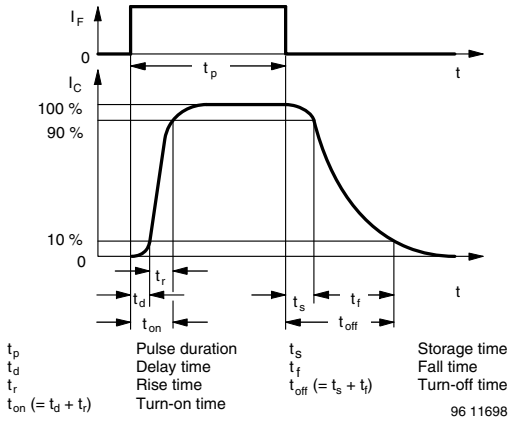


Fig. 5 - Switching Times

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 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 V, T_{amb} = 25 °C	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
Output safety power		P_{SO}	400	mW
Input safety current		I_{SI}	275	mA
Safety temperature		T_S	175	°C
Creepage distance			≥ 7	mm
Clearance distance			≥ 7	mm
Insulation thickness		DTI	≥ 0.4	mm
Partial discharge test voltage - routine test	100 %, t_{test} = 1 s	V_{pd}	1.669	kV_{peak}
Partial discharge test voltage - lot test (sample test)	t_{Tr} = 60 s, t_{test} = 10 s, (see Fig. 2)	V_{pd}	1.424	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 °C, unless otherwise specified)

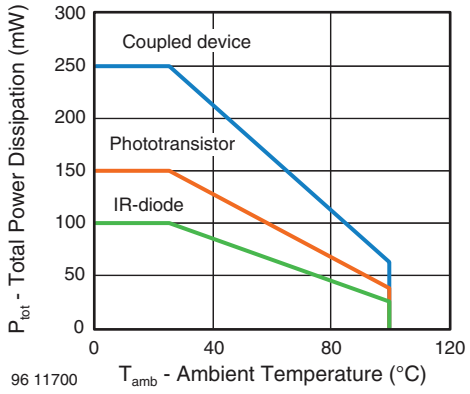


Fig. 6 - Total Power Dissipation vs. Ambient Temperature

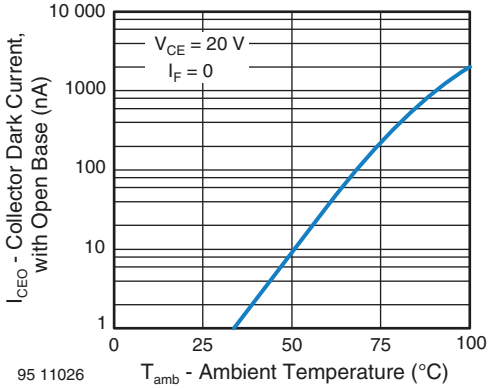


Fig. 9 - Collector Dark Current vs. Ambient Temperature

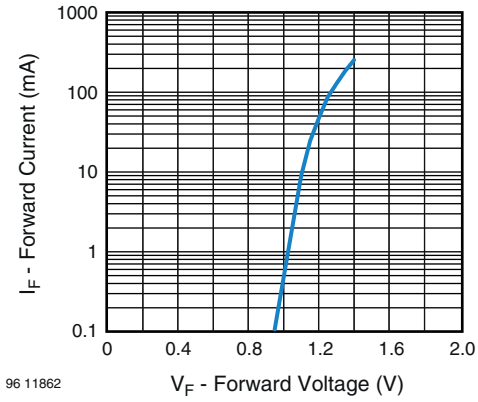


Fig. 7 - Forward Current vs. Forward Voltage

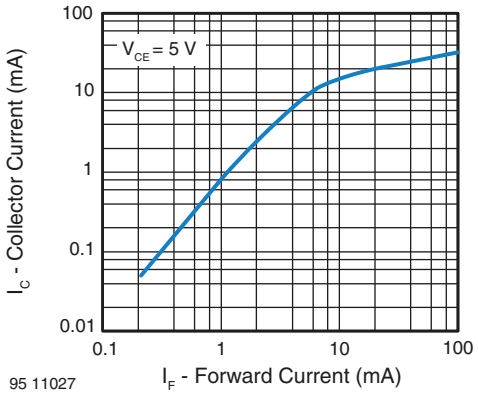


Fig. 10 - Collector Current vs. Forward Current

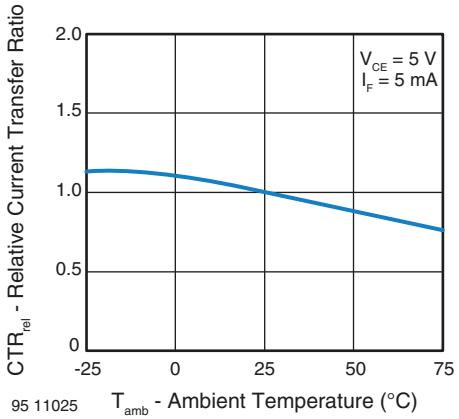


Fig. 8 - Relative Current Transfer Ratio vs. Ambient Temperature

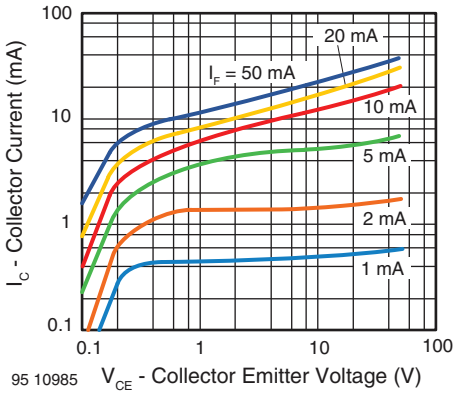


Fig. 11 - Collector Current vs. Collector Emitter Voltage

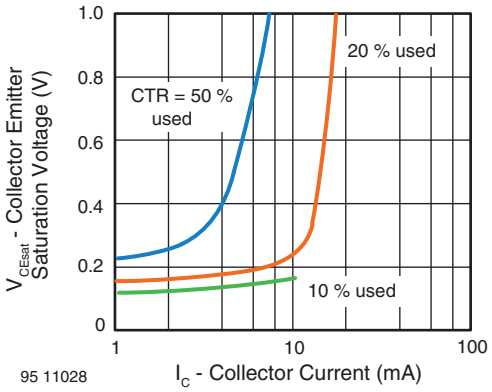


Fig. 12 - Collector Emitter Saturation Voltage vs. Collector Current

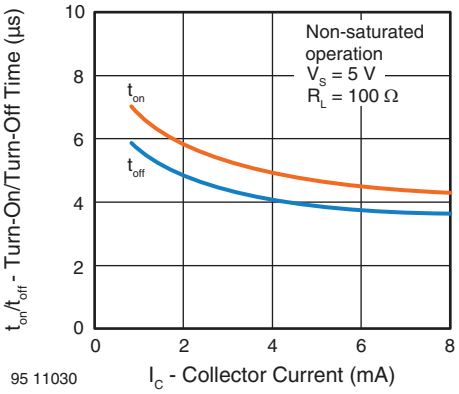


Fig. 14 - Turn-on/off Time vs. Collector Current

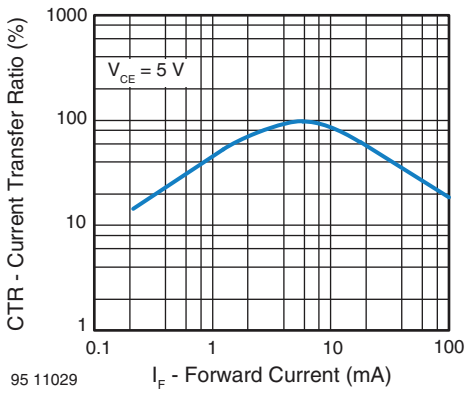


Fig. 13 - Current Transfer Ratio vs. Forward Current

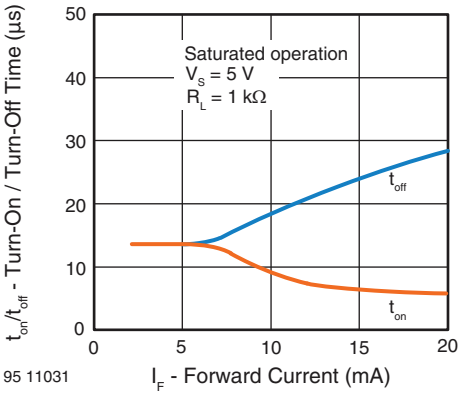
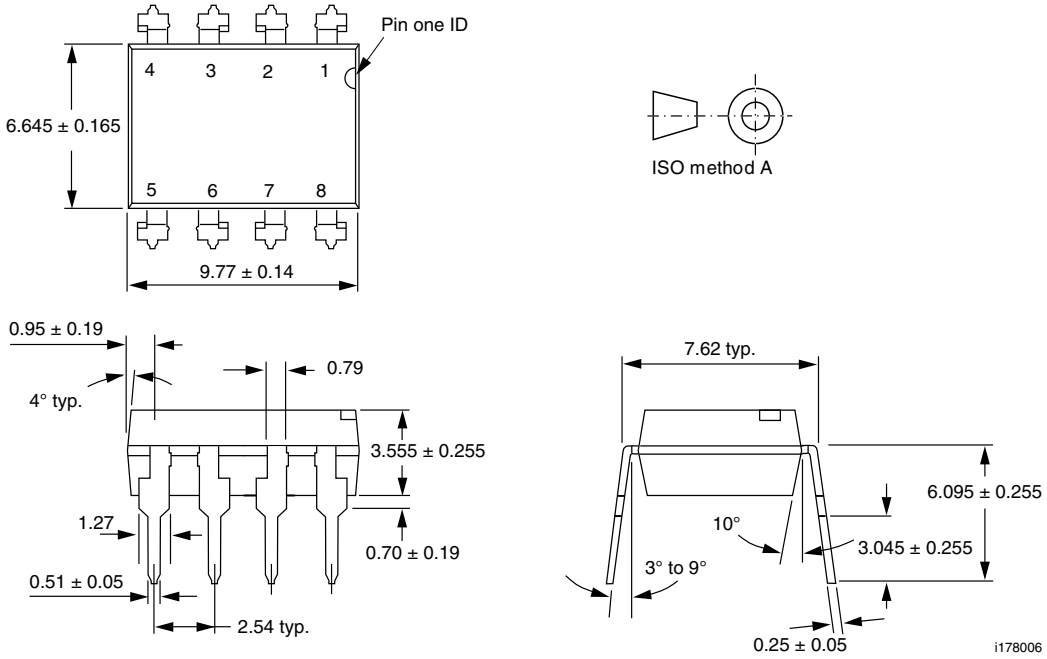
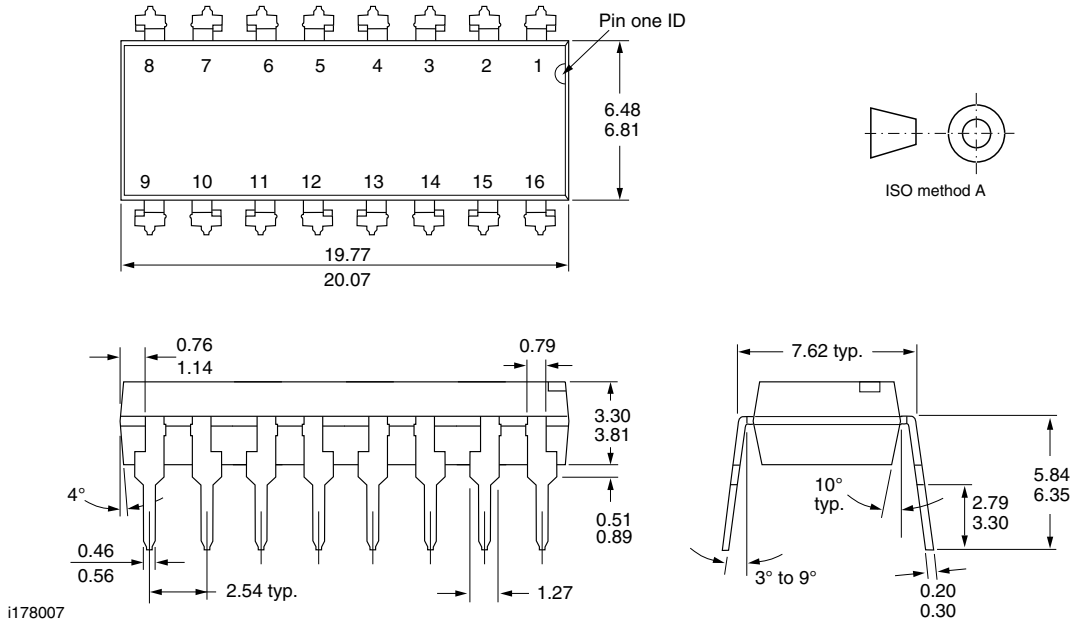


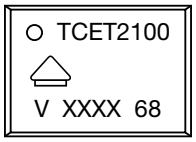
Fig. 15 - Turn-On / Turn-Off Time vs. Forward Current

PACKAGE DIMENSIONS in millimeters





PACKAGE MARKING (example)



Note

- XXXX = LMC (lot marking code)

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