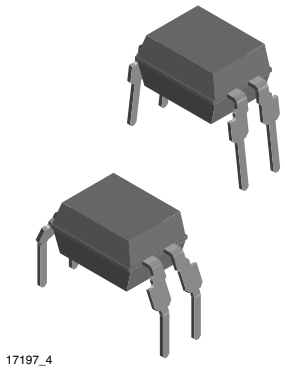
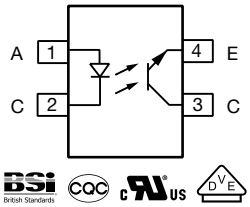
Optocoupler, Phototransistor Output





FEATURES

- High common mode rejection
- CTR offered in 5 groups
- Low temperature coefficient of CTR
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free
e3
RoHS COMPLIANT

APPLICATIONS

- Switch-mode power supplies
- Line receiver
- Computer peripheral interface
- Microprocessor system interface
- Reinforced isolation provides circuit protection against electrical shock (safety class II)
- Circuits for safe protective separation against electrical shock according to safety class II (reinforced isolation):
  - for appl. class I - IV at mains voltage ≤ 300 V
  - for appl. class I - III at mains voltage ≤ 600 V
  according to DIN EN 60747-5-5 (VDE 0884-5)

AGENCY APPROVALS

- UL1577
- cUL1577
- DIN EN 60747-5-5 (VDE 0884-5)
- BSI
- CQC GB8898-2011
- CQC GB4943.1-2011

LINKS TO ADDITIONAL RESOURCES

Related Documents

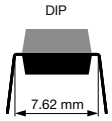
DESCRIPTION

The TCET1200 consists of a phototransistor optically coupled to a gallium arsenide infrared-emitting diode in a 4 pin plastic dual inline package.

ORDERING INFORMATION

T	C	E	T	1	2	0	#

PART NUMBER



AGENCY CERTIFIED / PACKAGE	CTR (%)			
	10 mA			
UL, VDE, BSI, FIMKO	40 to 80	63 to 125	100 to 200	160 to 320
DIP-4	TCET1201	TCET1202	TCET1203	TCET1204

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}	70	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}	70	mW
Junction temperature		T_j	125	°C
COUPLER				
Isolation test voltage (RMS)		V_{ISO}	5000	V_{RMS}
Total power dissipation		P_{tot}	200	mW
Operating ambient temperature range		T_{amb}	-40 to +100	°C
Storage temperature range		T_{stg}	-55 to +125	°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 = 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 A, 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	-	0.6	-	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**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
I_C/I_F	V_{CE} = 5 V, I_F = 5 mA	TCET1200	CTR	50	-	600	%
	V_{CE} = 5 V, I_F = 10 mA	TCET1201	CTR	40	-	80	%
		TCET1202	CTR	63	-	125	%
		TCET1203	CTR	100	-	200	%
		TCET1204	CTR	160	-	320	%

SAFETY AND 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 Fig. 2)	V_{pd}	1.36	-	-	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
Rated impulse voltage		V_{IOTM}	-	-	6	kV
Max. working voltages	Recurring peak voltage	V_{IORM}	850	-	-	V
Forward current		I_F	-	-	130	mA
Power dissipation		P_{diss}	-	-	265	mW
Safety temperature		T_{si}	-	-	150	°C
Creepage distance			-	-	7.6	mm

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

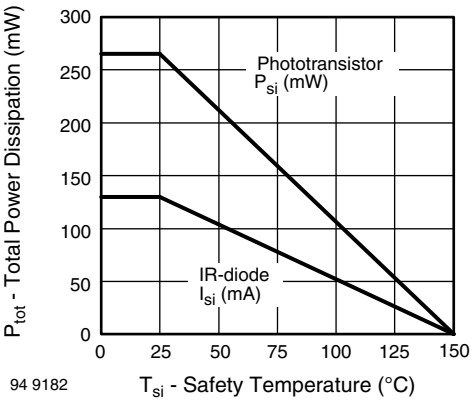


Fig. 1 - Derating Diagram

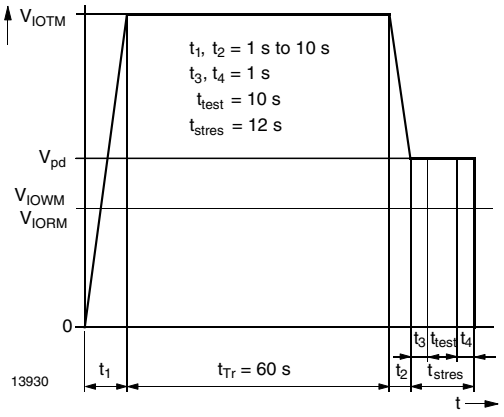


Fig. 2 - Test Pulse Diagram for Sample Test According to DIN EN 60747-5-5

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 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
Fall time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see Fig. 3)	t_f	-	4.7	-	µs
Storage time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see Fig. 3)	t_s	-	0.3	-	µs
Turn-on time	V_S = 5 V, I_C = 2 mA, R_L = 100 Ω, (see Fig. 3)	t_{on}	-	6	-	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

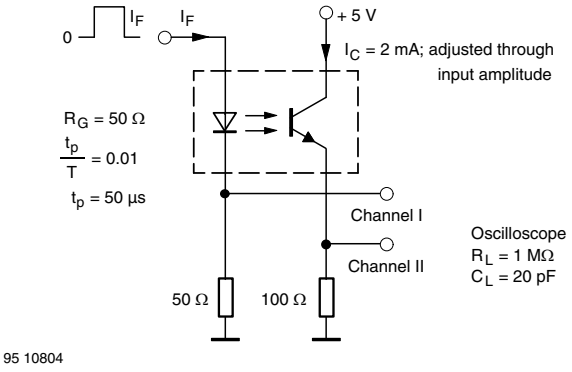


Fig. 3 - Test Circuit, Non-Saturated Operation

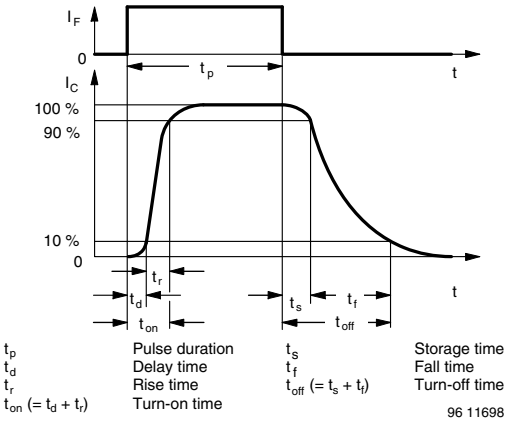


Fig. 5 - Switching Times

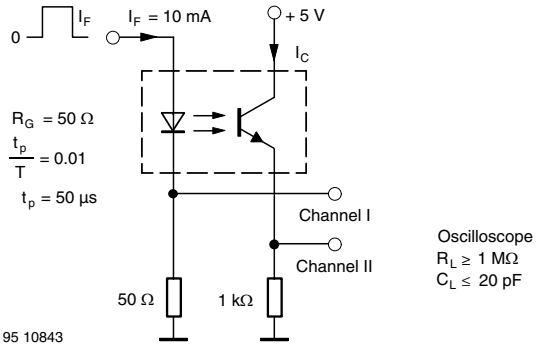


Fig. 4 - Test Circuit, Saturated Operation

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

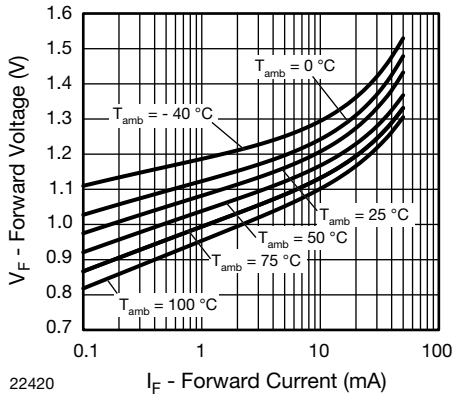


Fig. 6 - Forward Voltage vs. Forward Current

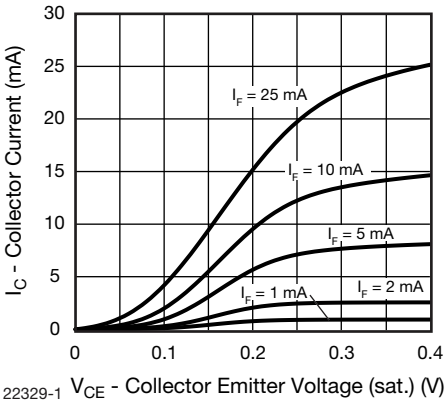


Fig. 9 - Collector Current vs. Collector Emitter Voltage (saturated)

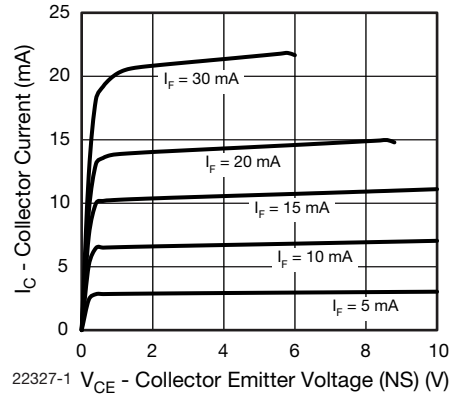


Fig. 7 - Collector Current vs. Collector Emitter Voltage (non-saturated)

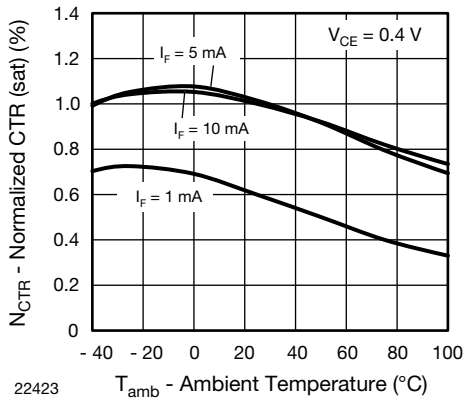


Fig. 10 - Normalized CTR (saturated) vs. Ambient Temperature

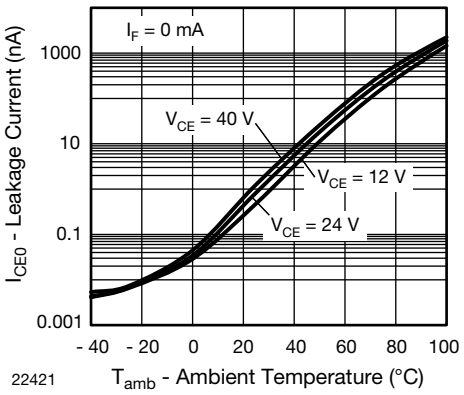


Fig. 8 - Leakage Current vs. Ambient Temperature

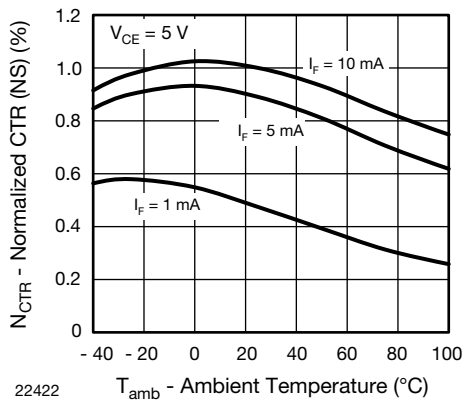


Fig. 11 - Normalized CTR (non-saturated) vs. Ambient Temperature

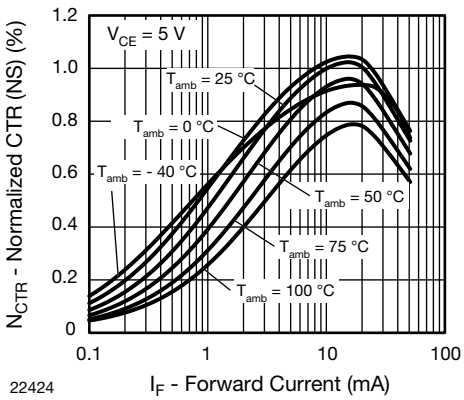


Fig. 12 - Normalized CTR (non-saturated) vs. Forward Current

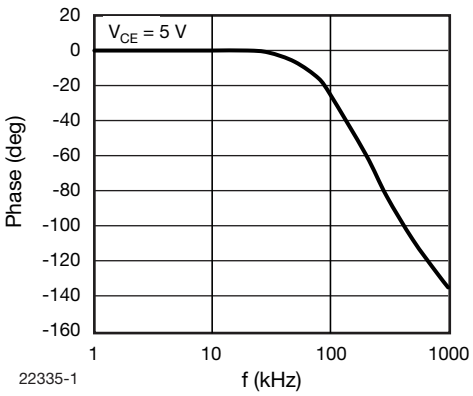


Fig. 15 - F_{CTR} vs. Phase Angle (kHz)

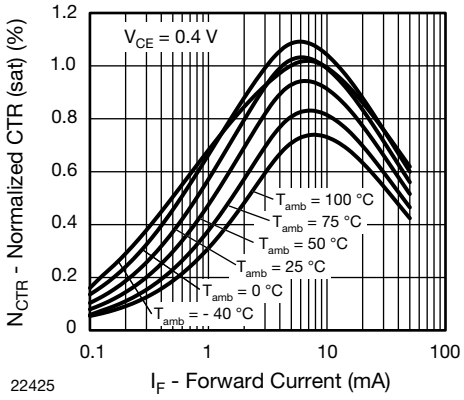


Fig. 13 - Normalized CTR (saturated) vs. Forward Current

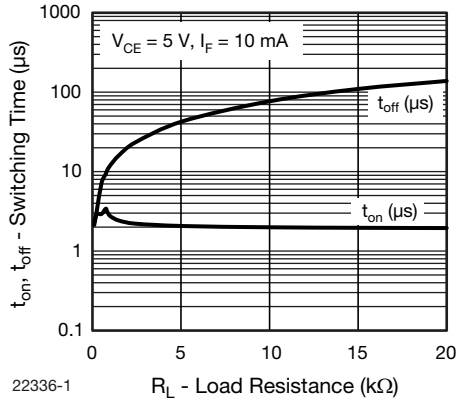


Fig. 16 - Switching Time vs. Load Resistance

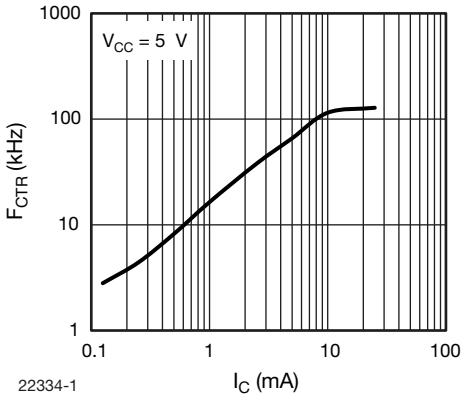
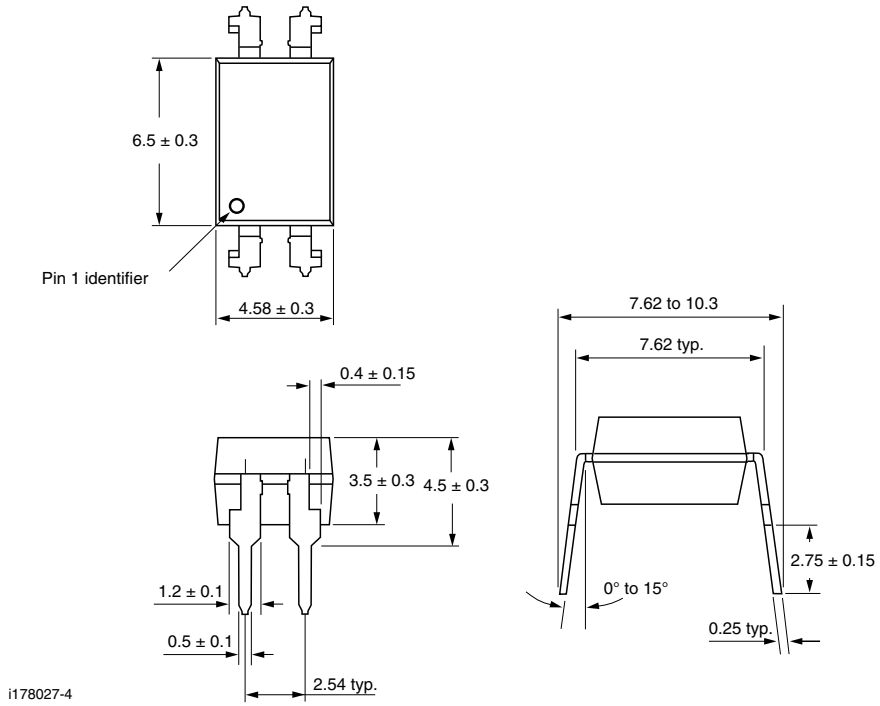
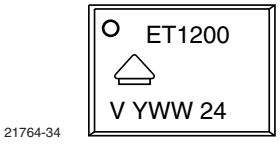


Fig. 14 - F_{CTR} vs. I_C (saturated) (mA)

PACKAGE DIMENSIONS in millimeters



PACKAGE MARKING



Note

- VDE logo is only printed on option 1 parts. Option information is not marked on the part

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