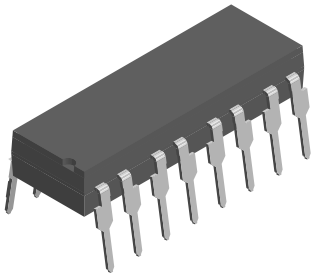
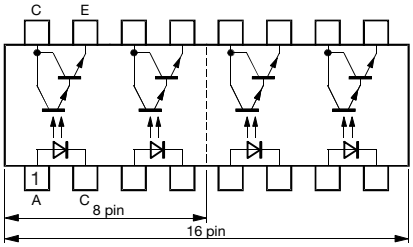
Optocoupler, Photodarlington Output, Dual Channel, High Gain





LINKS TO ADDITIONAL RESOURCES

Product Page | Design Tools | SPICE Models | Footprints | Schematics

VDE STANDARDS

These couplers perform safety functions according to the following equipment standards:

- **DIN EN 60747-5-5 (VDE 0884)**
  Optocoupler for electrical safety requirements
- **IEC 60950 / EN 60950**
  Office machines (applied for reinforced isolation for mains voltage ≤ 400 V_{RMS})
- **VDE 0804**
  Telecommunication apparatus and data processing
- **IEC 60065**
  Safety for mains-operated electronic and related household apparatus

DESCRIPTION

The TCED4100 consists of a phototransistor optically coupled to a gallium arsenide infrared-emitting diode in a 8-pin (dual) or 16-pin (quad) plastic dual inline package.

The elements are mounted on one leadframe providing a fixed distance between input and output for highest safety requirements.

FEATURES

Pb-free

e3

RoHS COMPLIANT

- Isolation materials according to UL 94 V-0
- Pollution degree 2 (DIN/VDE 0110/resp. IEC 60664)
- Climatic classification 55/100/21 (IEC 60068 part 1)
- Special construction: therefore, extra low coupling capacity of typical 0.2 pF, high common mode rejection
- Low temperature coefficient of CTR
- Creepage current resistance according to VDE 0303 / IEC 60112 comparative tracking index: CTI ≥ 175
- Rated impulse voltage (transient overvoltage) V_{IOTM} = 8 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_{RMS}
- Rated recurring peak voltage (repetitive) V_{IORM} = 848 V peak
- Thickness though insulation ≥ 0.75 mm
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- Switch-mode power supplies
- Line receiver
- Computer peripheral interface
- Microprocessor system interface
- 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)

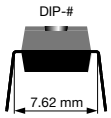
AGENCY APPROVALS

- UL
- cUL

ORDERING INFORMATION

T	C	E	D	4	1	0	0

PART NUMBER



AGENCY CERTIFIED / PACKAGE	CTR (%)
UL, cUL	≥ **600**
DIP-16	TCED4100

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Peak reverse voltage		V_R	6.0	V
Forward continuous 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 breakdown voltage		BV_{CEO}	35	V
Emitter collector breakdown voltage		BV_{ECO}	7.0	V
$I_{CMAX\ DC}$		$I_{CMAX\ DC}$	80	mA
I_{CMAX}	t < 1.0 ms	I_{CMAX}	100	mW
Power dissipation		P_{diss}	150	mW
Junction temperature		T_j	125	°C
COUPLER				
Isolation test voltage	t = 1 min	V_{ISO}	5000	V_{RMS}
Total package dissipation		P_{tot}	250	mW
Storage temperature		T_{stg}	-40 to +100	°C
Operating temperature		T_{amb}	-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 = 20 mA	V_F	-	1.15	1.4	V
Junction capacitance	V_R = 0 V, f = 1.0 MHz	C_j	-	50	-	pF
OUTPUT						
Collector emitter breakdown voltage	I_C = 1 mA	BV_{CEO}	32	-	-	V
Emitter collector breakdown voltage	I_E = 100 µA	BV_{ECO}	7.0	-	-	V
Collector emitter cut-off current	V_{CE} = 10 V, I_f = 0 A, E = 0	I_{CEO}		15	100	nA
COUPLER						
Saturation voltage, collector emitter	I_{CE} = 0.5 mA	V_{CEsat}	-	-	1.0	V
Cut-off frequency	V_{CE} = 5 V, I_F = 10 mA, R_L = 100 Ω	f_c	-	10	-	kHz
Coupling capacitance	f = 1 MHz	C_k	-	0.3	-	pF

Note

- Minimum and maximum values are 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 (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
I_C/I_F	V_{CE} = 2 V, I_F = 1 mA	CTR	600	800	-	%

MAXIMUM SAFETY RATINGS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
Forward current		I_F	-	-	130	mA
OUTPUT						
Power dissipation		P_{diss}	-	-	265	mW
COUPLER						
Rated impulse voltage		V_{IOTM}	-	-	8	kV
Safety temperature		T_{si}	-	-	150	°C

Note

- According to DIN EN 60747-5-5 (see Fig. 1). 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 Fig. 2)	V_{IOTM}	8	-	-	kV
		V_{pd}	1.3	-	-	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

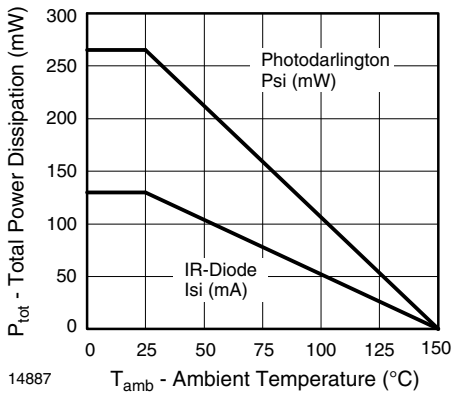


Fig. 1 - Derating Diagram

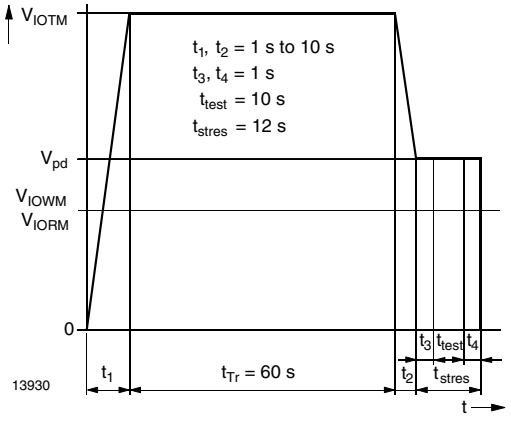


Fig. 2 - Test Pulse Diagram for Sample Test According to DIN EN 60747-5-5/DIN EN 60747-; IEC60747

SWITCHING CHARACTERISTICS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Rise time	V_{CC} = 2 V, I_C = 10 mA, R_L = 100 Ω, (see Fig. 3)	t_r	-	300	-	µs
Fall time	V_{CC} = 2 V, I_C = 10 mA, R_L = 100 Ω, (see Fig. 3)	t_f	-	250	-	µs

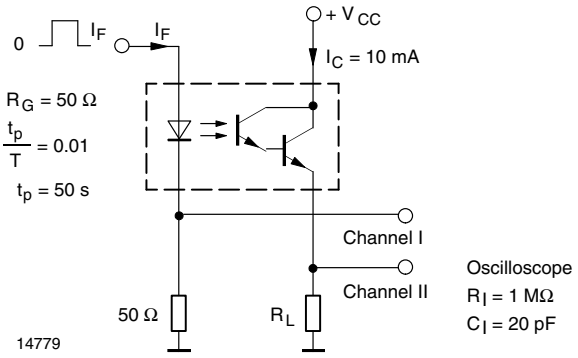


Fig. 3 - Test Circuit, Non-Saturated Operation

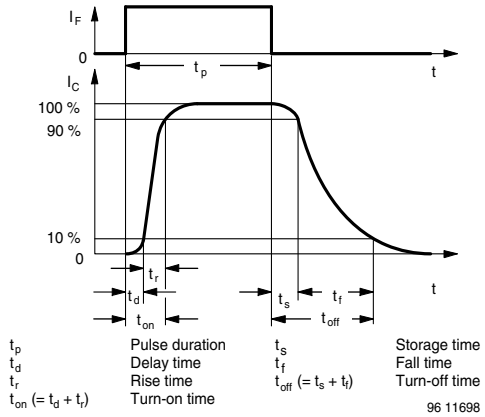


Fig. 4 - Switching Times

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

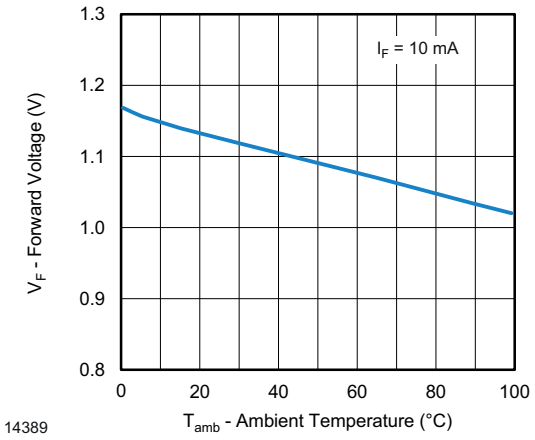


Fig. 5 - Forward Voltage vs. Ambient Temperature

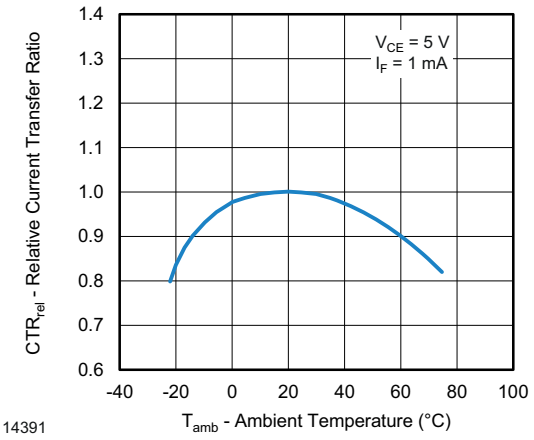


Fig. 7 - Relative Current Transfer Ratio vs. Ambient Temperature

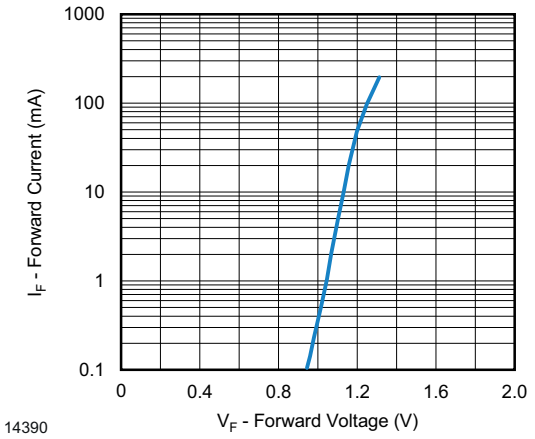


Fig. 6 - Forward Current vs. Forward Voltage

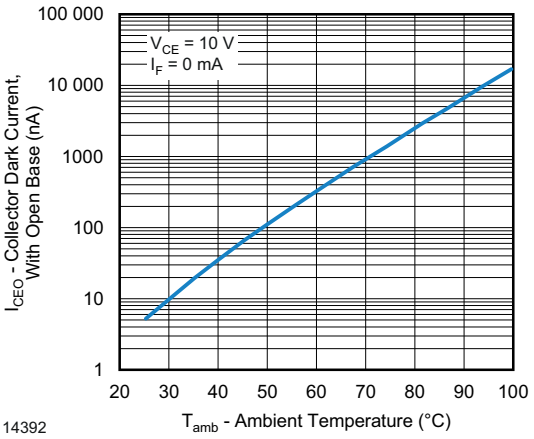


Fig. 8 - Collector Dark Current vs. Ambient Temperature

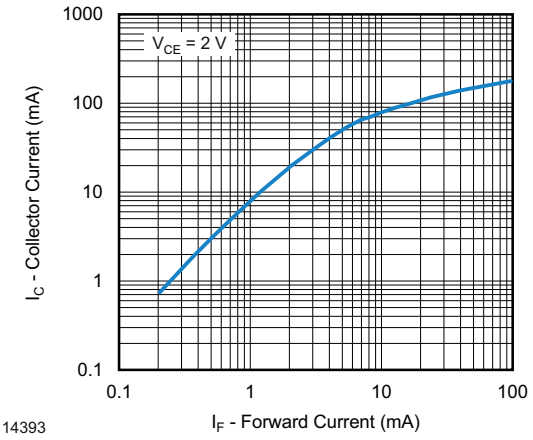


Fig. 9 - Collector Current vs. Forward Current

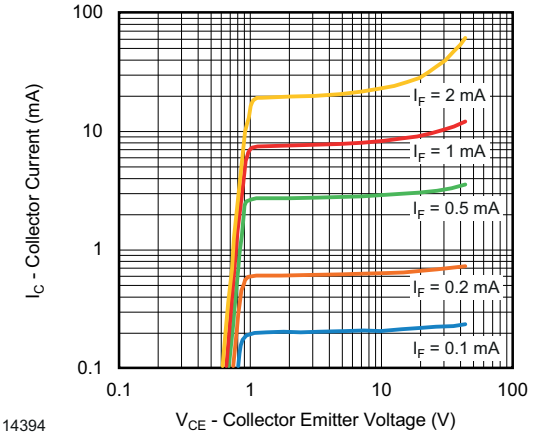


Fig. 10 - Collector Current vs. Collector Emitter Voltage

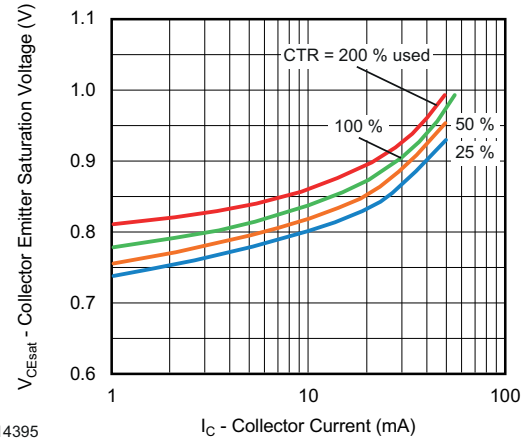


Fig. 11 - Collector Emitter Saturation Voltage vs. Collector Current

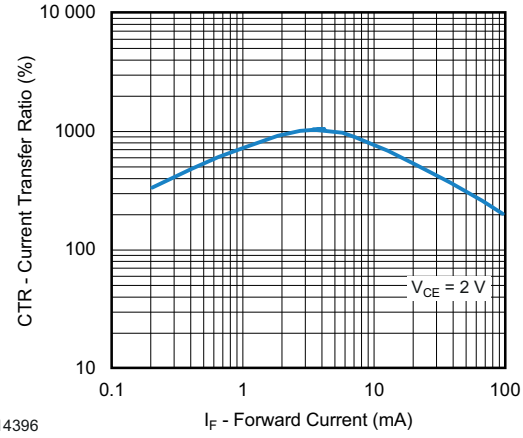
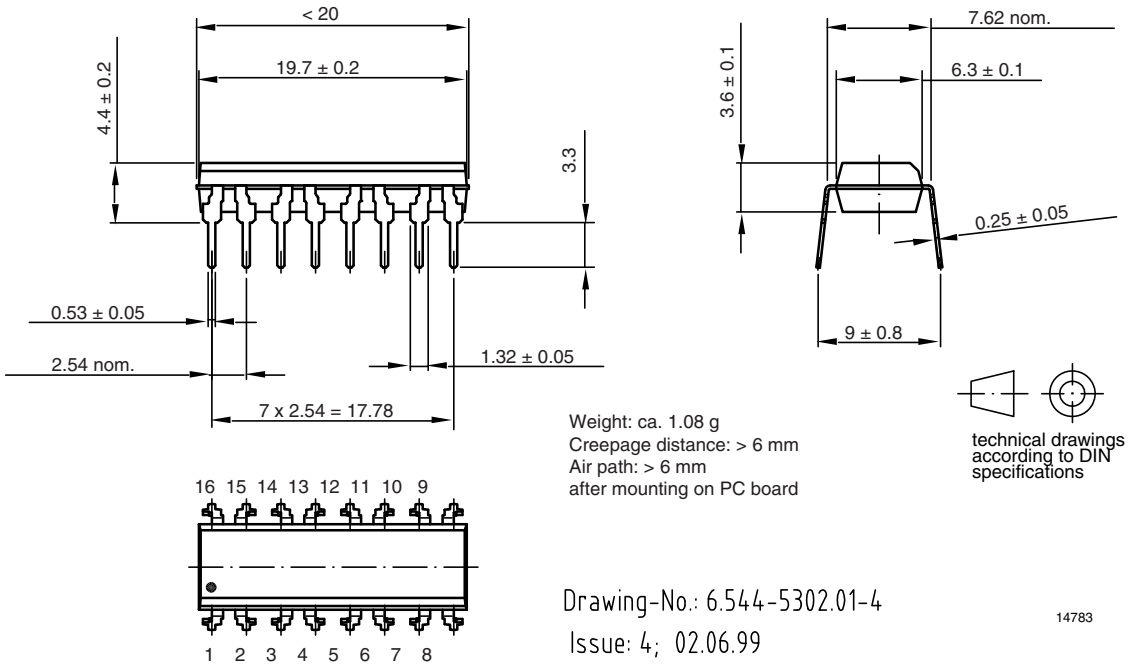
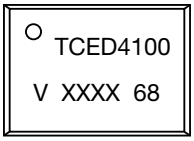


Fig. 12 - Current Transfer Ratio vs. Forward Current

PACKAGE DIMENSIONS in millimeters



PACKAGE MARKING (example)



Note

- XXXX = LMC (lot marking code)

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