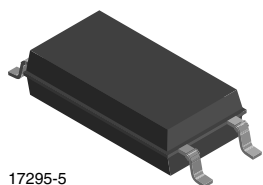
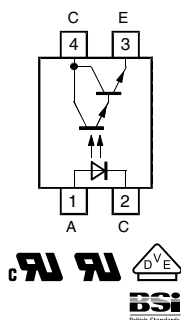


Optocoupler, Photodarlington Output, SOP-4L, Long Mini-Flat Package



17295-5



FEATURES

- Low profile package
- Darlington output
- Extra low coupling capacity - typical 0.2 pF
- High common mode rejection
- Creepage current resistance according to VDE 0303/IEC 60112 comparative tracking index: CTI ≥ 175
- Creepage distance > 8 mm
- Tested acc. 60950: AM4: 1997 clause 2.9.6.
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912



DESCRIPTION

The TCLD1000 consists of a darlington phototransistor optically coupled to a gallium arsenide infrared-emitting diode in a 4-lead SO6L package.

AGENCY APPROVALS

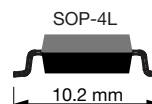
- UL1577, file no. E76222
- CSA 22.2 bulletin 5A, double protection
- BSI IEC 60950; IEC 60065
- DIN EN 60747-5-2 (VDE 0884)/DIN EN 60747-5-5 pending

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 to IV at mains voltage ≤ 300 V
 - for appl. class I to III at mains voltage ≤ 600 V according to DIN EN 60747-5-2 (VDE 0884)

ORDERING INFORMATION

T	C	L	D	1	0	0	0
PART NUMBER							



AGENCY CERTIFIED/PACKAGE	CTR (%)
UL, cUL, VDE, BSI	> 600
SOP-4L, mini-flat, long	TCLD1000

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 ≤ 10 μs	I _{FSM}	1.5	A
Power dissipation		P _{diss}	100	mW
Junction temperature		T _j	125	°C



ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
OUTPUT				
Collector emitter voltage		V_{CEO}	35	V
Emitter collector voltage		V_{ECO}	7	V
Collector current		I_C	80	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	$^{\circ}\text{C}$
COUPLER				
Isolation test voltage (RMS)		V_{ISO}	5000	V_{RMS}
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 ⁽¹⁾		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 ratings for extended periods of the time can adversely affect reliability.
- ⁽¹⁾ Wave soldering three cycles are allowed. Also refer to "Assembly Instructions" (www.vishay.com/doc?80054).

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
Forward voltage	$I_F = 20\text{ mA}$	V_F		1.1	1.4	V
Junction capacitance	$V_R = 0\text{ V}, f = 1\text{ MHz}$	C_j		50		pF
OUTPUT						
Collector emitter voltage	$I_C = 1\text{ mA}$	V_{CEO}	32			V
Emitter collector voltage	$I_E = 100\text{ }\mu\text{A}$	V_{ECO}	7			V
Collector emitter leakage current	$V_{CE} = 10\text{ V}, I_F = 0\text{ A}$	I_{CEO}		15	100	nA
COUPLER						
Collector emitter saturation voltage	$I_F = 20\text{ mA}, I_C = 5\text{ mA}$	V_{CEsat}			1	V
Cut-off frequency	$V_{CE} = 5\text{ V}, I_F = 10\text{ mA}, R_L = 100\text{ }\Omega$	f_c		10		kHz
Coupling capacitance	$f = 1\text{ MHz}$	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 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
I_C/I_F	$V_{CE} = 2\text{ V}, I_F = 1\text{ mA}$	CTR	600	800		%

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}	2			kV
Partial discharge test voltage - lot test (sample test)	$t_{Tr} = 60$ s, $t_{test} = 10$ s, (see figure 2)	V_{IOTM}	8			kV
		V_{pd}	1.68			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
Forward current		I_{si}	130			mA
Power dissipation		P_{so}	265			mW
Rated impulse voltage		V_{IOTM}	8			kV
Safety temperature		T_{si}	150			°C
Clearance distance			8.0			mm
Creepage distance			8.0			mm
Insulation distance (internal)			0.40			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.

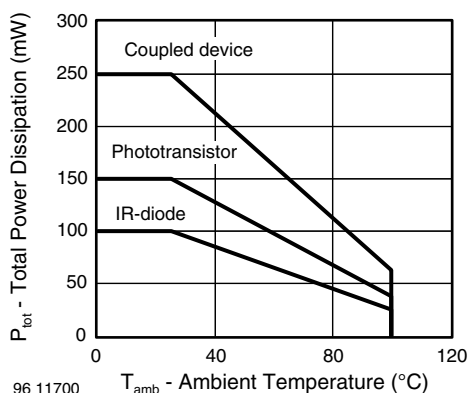


Fig. 1 - Derating Diagram

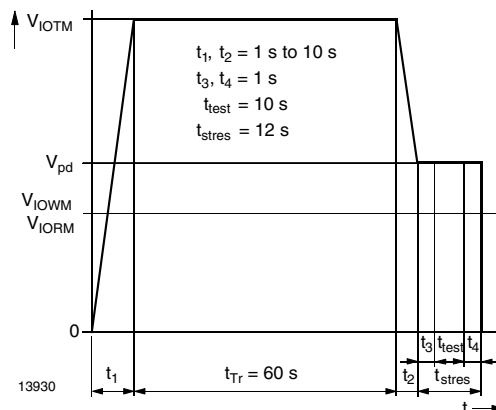


Fig. 2 - Test Pulse Diagram for Sample Test According to DIN EN 60747-5-2 (VDE 0884); IEC 60747-5-5

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

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Rise time	$V_{CE} = 2$ V, $I_C = 10$ mA, $R_L = 100$ Ω , (see figure 3)	t_r		300		μ s
Turn-off time	$V_{CE} = 2$ V, $I_C = 10$ mA, $R_L = 100$ Ω , (see figure 3)	t_{off}		250		μ s

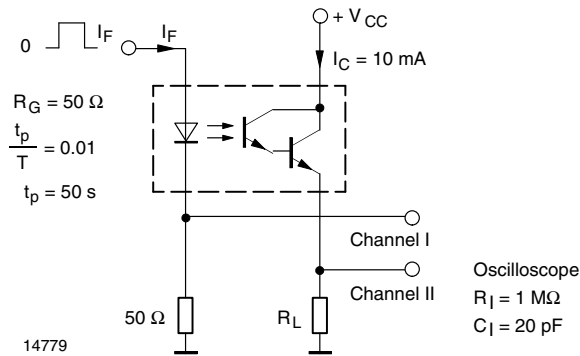


Fig. 3 - Test Circuit, Non-Saturated Operation

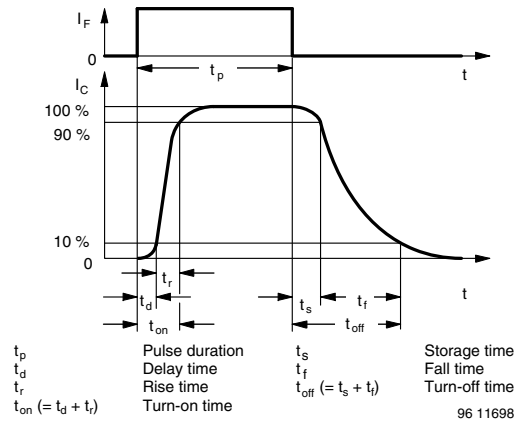


Fig. 4 - Switching Times

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

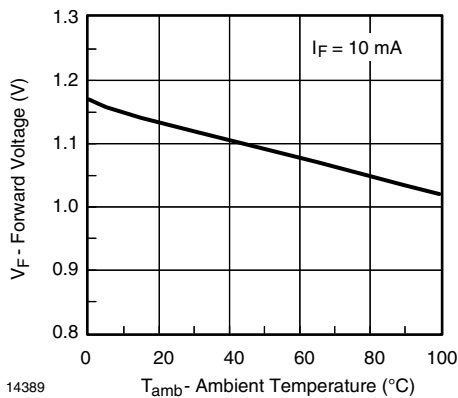


Fig. 5 - Forward Voltage vs. Ambient Temperature

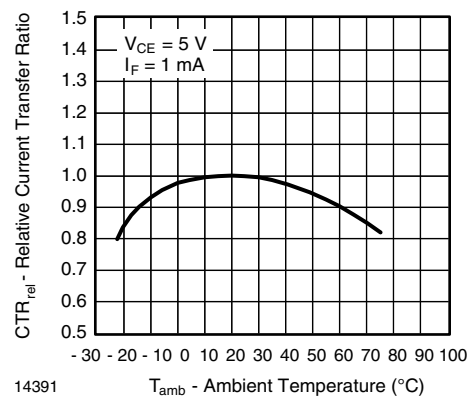


Fig. 7 - Relative Current Transfer Ratio vs. Ambient Temperature

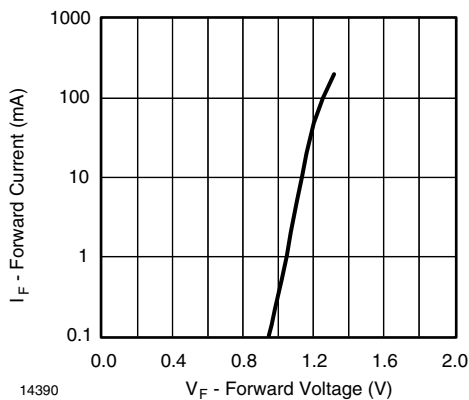


Fig. 6 - Forward Current vs. Forward Voltage

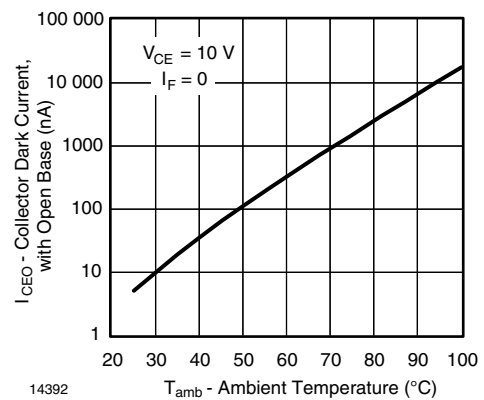


Fig. 8 - Collector Dark Current vs. Ambient Temperature

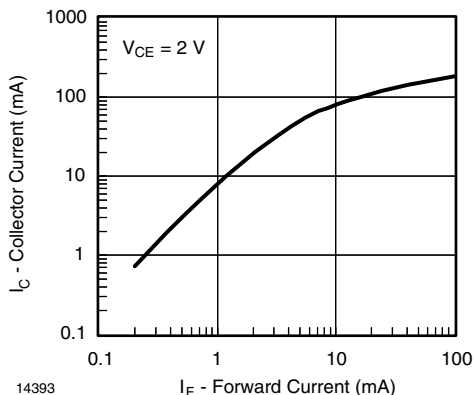


Fig. 9 - Collector Current vs. Forward Current

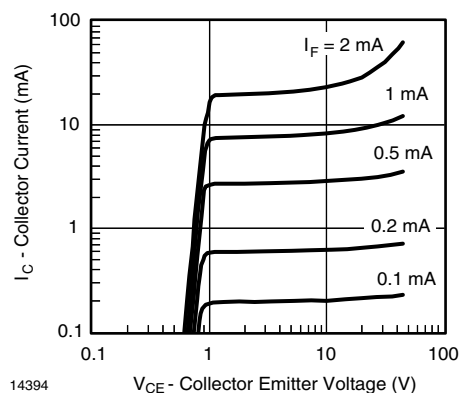
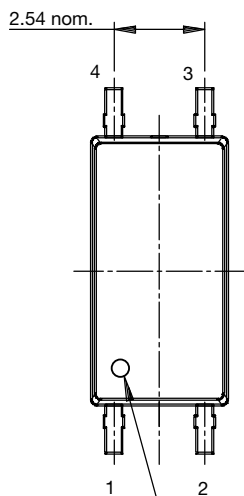
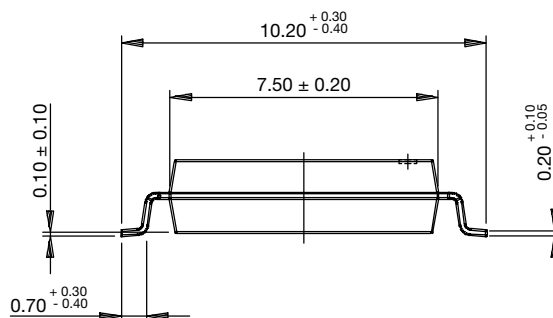
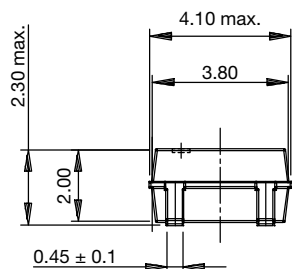


Fig. 10 - Collector Current vs. Collector Emitter Voltage

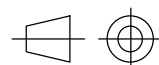
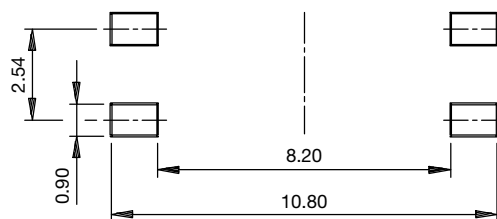
PACKAGE DIMENSIONS in millimeters



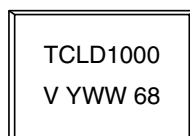
22533

Pin no. 1 identification

Possible footprint


technical drawings
according to DIN
specifications

PACKAGE MARKING





Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.