RoHS

COMPLIANT

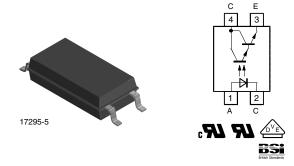
HALOGEN

FREE GREEN



Vishay Semiconductors

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



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

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





 Material categorization: For definitions of compliance please see <u>www.vishay.com/doc?99912</u>

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									
	Т	С	L	D	1	0	0	0	SOP-4L
-				PART N	UMBER				■ 10.2 mm
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	А				
Power dissipation		P _{diss}	100	mW				
Junction temperature		T _j	125	°C				



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ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °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	$t_p/T = 0.5, t_p \le 10 \text{ ms}$	I _{CM}	100	mA					
Power dissipation		P _{diss}	150	mW					
Junction temperature		T _j	125	°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	°C					
Storage temperature range		T _{stg}	-55 to +150	°C					
Soldering temperature (1)		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) Wave soldering three cycles are allowed. Also refer to "Assembly Instructions" (www.vishay.com/doc?80054).

ELECTRICAL CHARACTERISTICS (T _{amb} = 25 °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	$V_R = 0 V$, $f = 1 MHz$	Cj		50		pF		
OUTPUT	OUTPUT							
Collector emitter voltage	I _C = 1 mA	V _{CEO}	32			V		
Emitter collector voltage	I _E = 100 μA	V _{ECO}	7			V		
Collector ermitter leakage current	V _{CE} = 10 V, IF = 0 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	$V_{CE} = 5 \text{ V, I}_F = 10 \text{ mA},$ $R_L = 100 \Omega$	f _c		10		kHz		
Coupling capacitance	f = 1 MHz	C _k		0.3		pF		

Note

• Minimum and maximum values are tested requierements. 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	$V_{CE} = 2 \text{ V}, I_F = 1 \text{ mA}$	CTR	600	800		%	

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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 -	$t_{Tr} = 60 \text{ s}, t_{test} = 10 \text{ s},$	V_{IOTM}	8			kV	
lot test (sample test)	(see figure 2)	V_{pd}	1.68			kV	
	V _{IO} = 500 V	R _{IO}	10 ¹²			Ω	
Insulation resistance	V _{IO} = 500 V, T _{amb} = 100 °C	R _{IO}	10 ¹¹			Ω	
modation resistance	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.

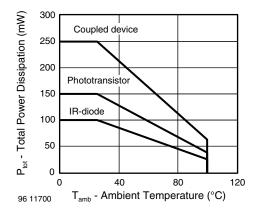


Fig. 1 - Derating Diagram

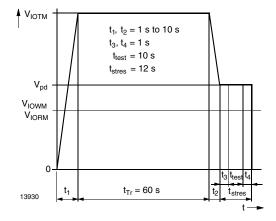


Fig. 2 - Test Pulse Diagram for Sample Test According to DIN EN 60747-5-2 (VDE 0884); IEC 60747-5-5

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		μs	
Turn-off time	$V_{CE} = 2 \text{ V}$, $I_{C} = 10 \text{ mA}$, $R_{L} = 100 \Omega$, (see figure 3)	t _{off}		250		μs	



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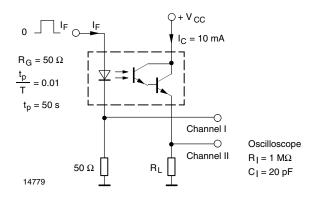


Fig. 3 - Test Circuit, Non-Saturated Operation

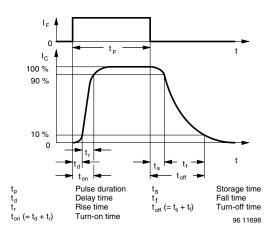


Fig. 4 - Switching Times

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

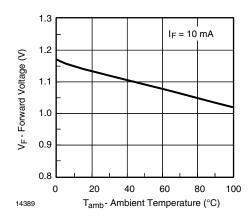


Fig. 5 - Forward Voltage vs. Ambient Temperature

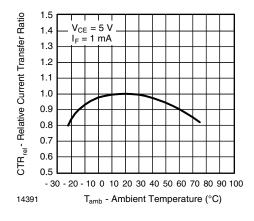


Fig. 7 - Relative Current Transfer Ratio vs. Ambient Temperature

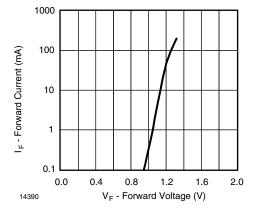


Fig. 6 - Forward Current vs. Forward Voltage

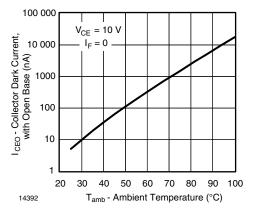
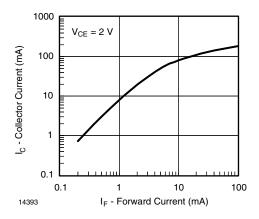


Fig. 8 - Collector Dark Current vs. Ambient Temperature









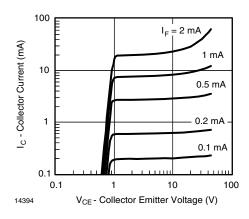
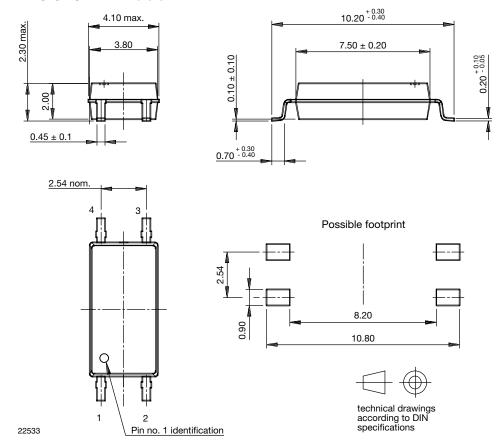
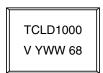


Fig. 10 - Collector Current vs. Collector Emitter Voltage

PACKAGE DIMENSIONS in millimeters



PACKAGE MARKING





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