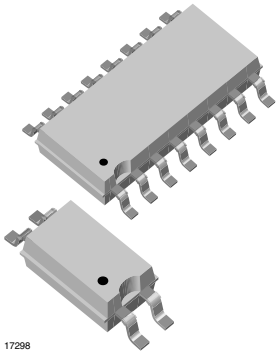
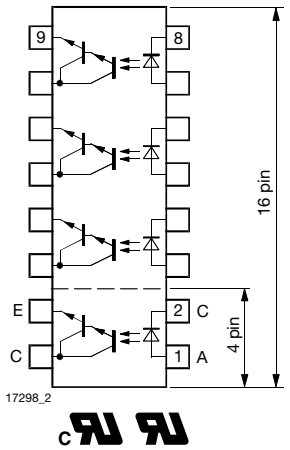
Optocoupler, Photodarlington Output, High Gain, Single/Quad Channel, Half Pitch Mini-Flat Package





FEATURES

- Low profile package (half pitch)
- AC isolation test voltage 3750 V_{RMS}
- Low coupling capacitance of typical 0.3 pF
- Low temperature coefficient of CTR
- Wide ambient temperature range
- Material categorization:
  For definitions of compliance please see www.vishay.com/doc?99912

Pb-free
e3
RoHS COMPLIANT
GREEN (5-2008)

APPICLATIONS

- Programmable logic
- Modems
- Answering machines
- General applications

AGENCY APPROVALS

- UL1577, file no. E76222 system code M, double protection
- CSA 22.2 bulletin 5A, double protection
- DIN EN 60747-5-5 (VDE 0884-5)
- FIMKO
- BSI

DESCRIPTION

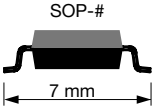
The TCMD1000, TCMD4000 consist of a photodarlington optically coupled to a gallium arsenide infrared-emitting diodes in either a 4 pin or 16 pin miniflat package.

The elements provide a fixed distance between input and output for highest safety requirements.

ORDERING INFORMATION

T	C	M	D	#	0	0	0

PART NUMBER



AGENCY CERTIFIED/PACKAGE	CTR (%)
UL, cUL, FIMKO, BSI, VDE	**> 600**
SOP-4	TCMD1000
SOP-16, quad channel	TCMD4000

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

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, $t_P \leq$ 10 ms	I_{CM}	100	mA
Power dissipation		P_{diss}	150	mW
Junction temperature		T_j	125	°C
COUPLER				
AC isolation test voltage (RMS)		V_{ISO} (1)	3750	V_{RMS}
Total power dissipation		P_{tot}	250	mW
Operating ambient temperature range		T_{amb}	- 40 to + 100	°C
Storage temperature range		T_{stg}	- 40 to + 125	°C
Soldering temperature (2)		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) Related to standard climate 23/50 DIN 50014.

(2) Wave soldering three cycles are allowed. Also refer to “Assembly Instruction” (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 = 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 = 100 µA	V_{CEO}	35			V
Emitter collector voltage	I_E = 100 µA	V_{ECO}	7			V
Collector dark current	V_{CE} = 10 V, I_F = 0, E = 0	I_{CEO}			100	nA
coupler						
Collector emitter saturation voltage	I_F = 20 mA, I_C = 5 mA	V_{CEsat}			1	V
Cut-off frequency	I_F = 10 mA, V_{CE} = 5 V, R_L = 100 Ω	f_c		10		kHz
Coupling capacitance	f = 1 MHz	C_k		0.3		pF

Note

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. 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**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
I_C/I_F	V_{CE} = 2 V, I_F = 1 mA	TCMD1000	CTR	600	800		%
		TCMD4000	CTR	600	800		%

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 1)	t_r		300		µs
Turn-off time	V_{CE} = 2 V, I_C = 10 mA, R_L = 100 Ω (see figure 1)	t_{off}		250		µs

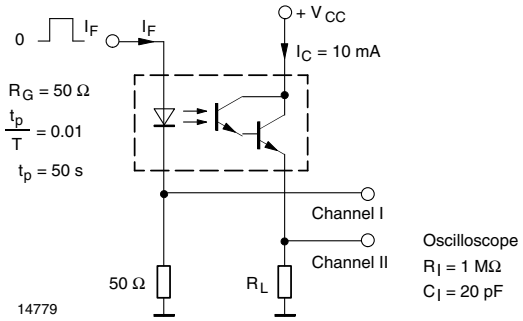


Fig. 1 - Test Circuit, Non-Saturated Operation

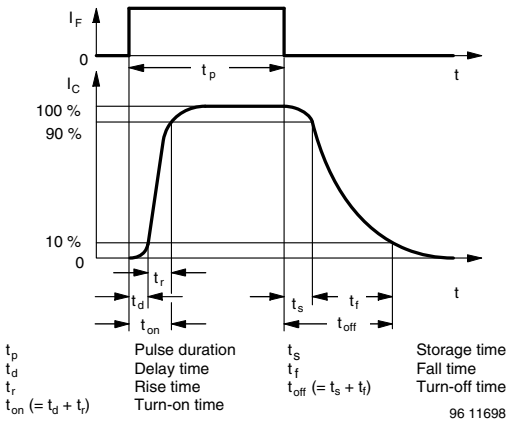


Fig. 2 - Switching Times

SAFETY AND INSULATION RATINGS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Climatic classification	IEC 68 part 1			40/110/21		
Comparative tracking index		CTI	175		399	
V_{IOTM}			6000			V
V_{IORM}			707			V
P_{SO}					265	mW
I_{SI}					130	mA
T_{SI}					150	°C
Creepage distance			5			mm
Clearance distance			5			mm
Insulation thickness, reinforce rated	per IEC 60950 2.10.5.1		0.4			mm

Note

- As per IEC 60747-5-2, § 7.4.3.8.1, 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)

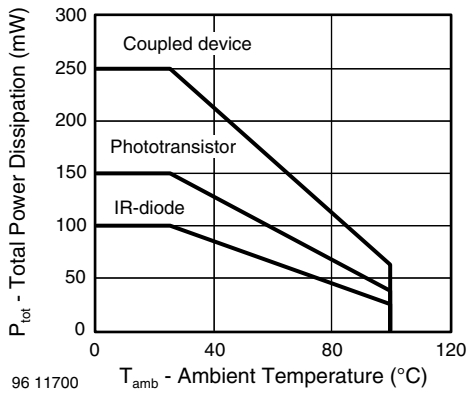


Fig. 3 - Forward Voltage vs. Ambient Temperature

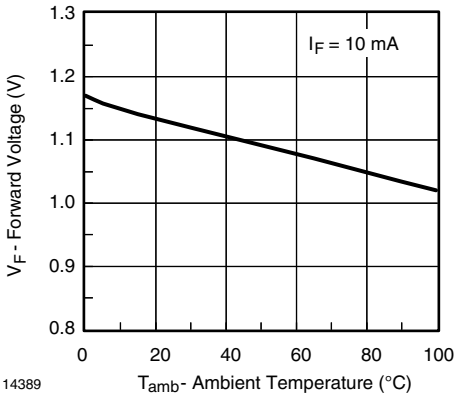


Fig. 4 - Forward Voltage vs. Ambient Temperature

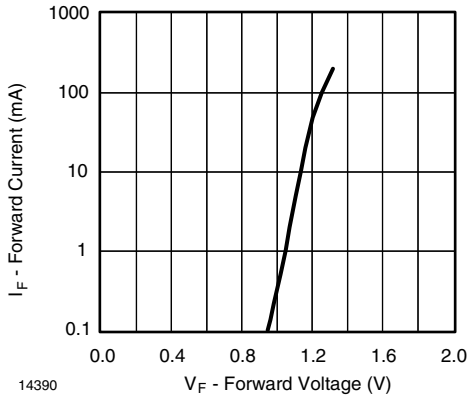


Fig. 5 - Forward Current vs. Forward Voltage

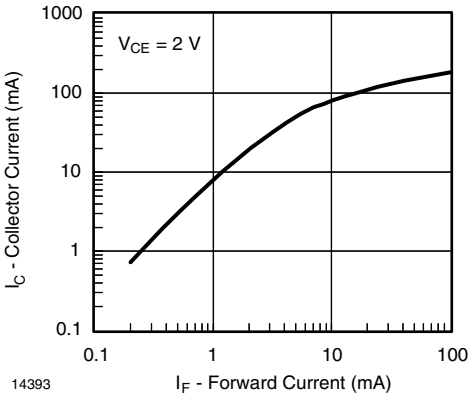


Fig. 8 - Collector Current vs. Forward Current

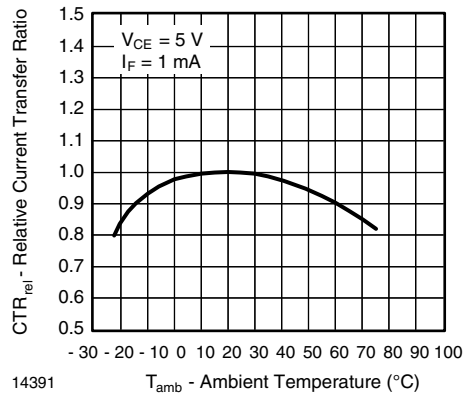


Fig. 6 - Relative Current Transfer Ratio vs. Ambient Temperature

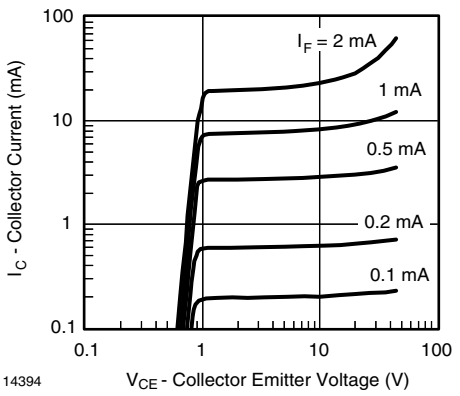


Fig. 9 - Collector Current vs. Collector Emitter Voltage

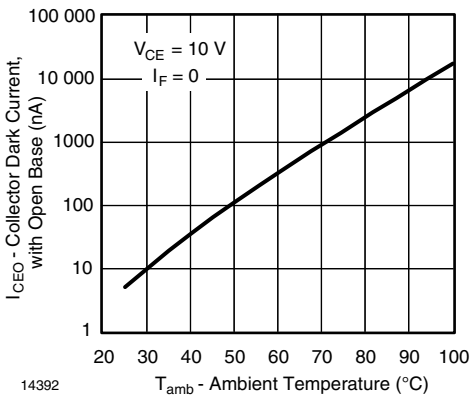


Fig. 7 - Collector Dark Current vs. Ambient Temperature

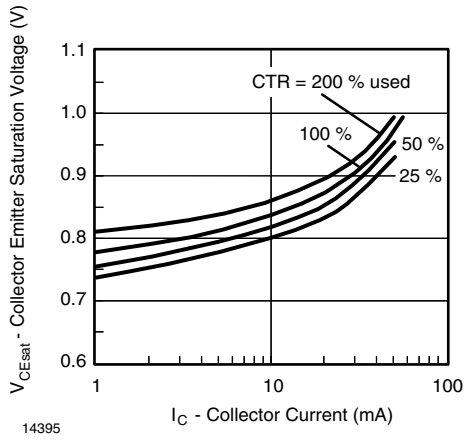


Fig. 10 - Collector Emitter Saturation Voltage vs. Collector Current

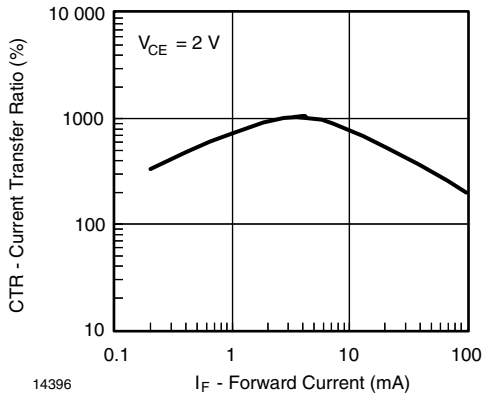
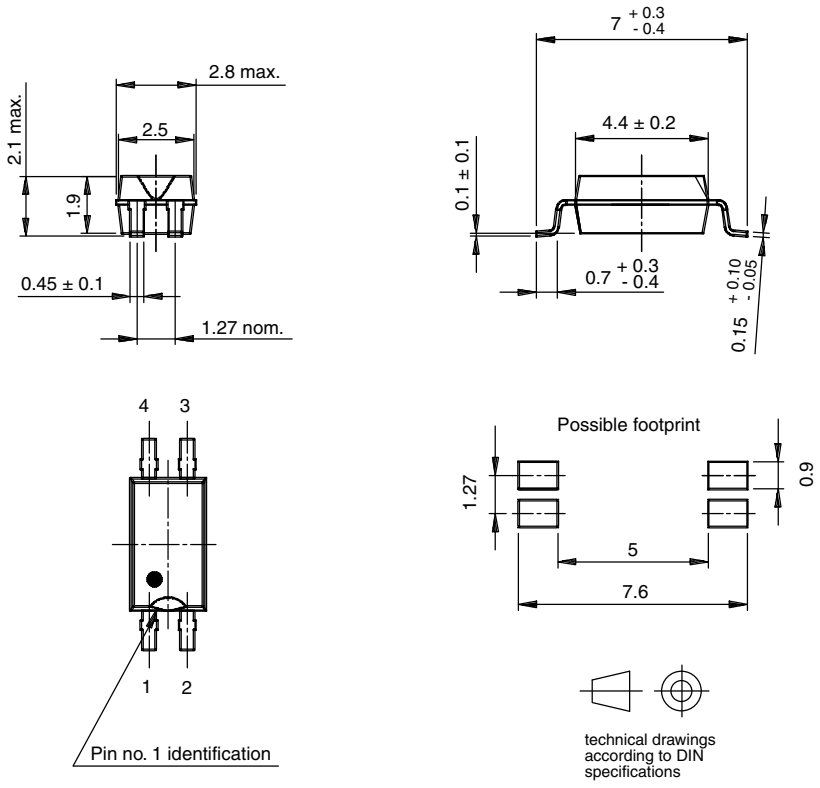
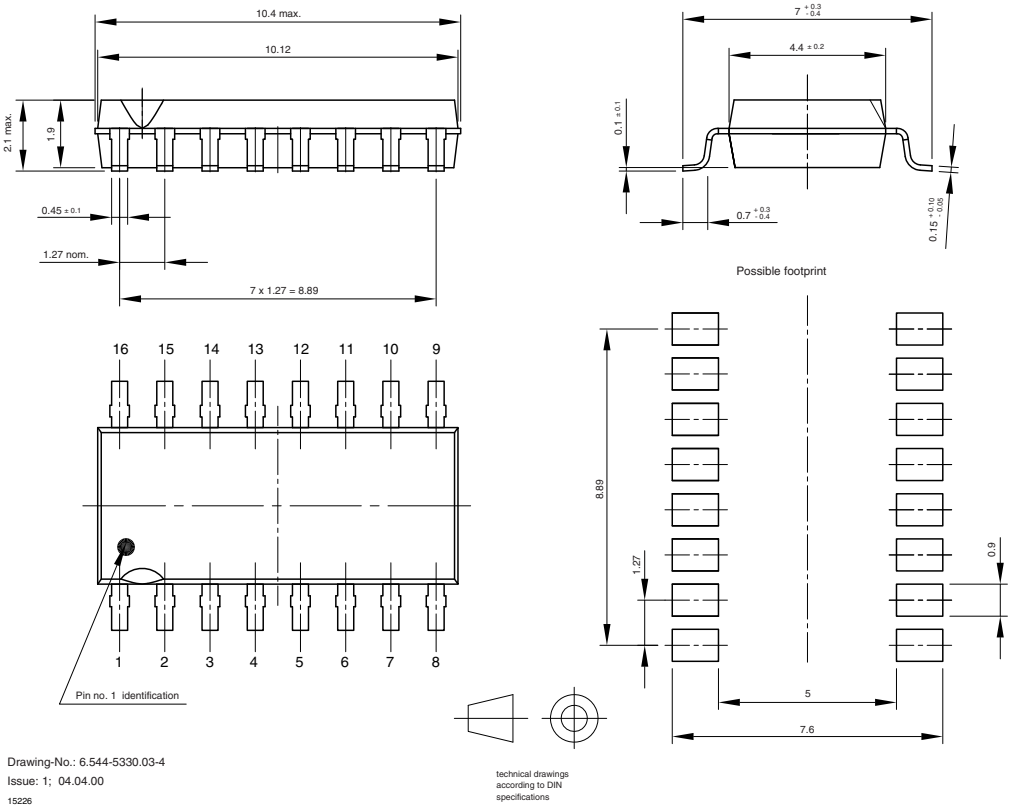


Fig. 11 - Current Transfer Ratio vs. Forward Current

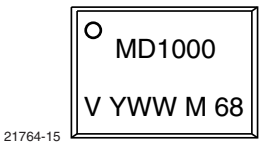
PACKAGE DIMENSIONS in millimeters



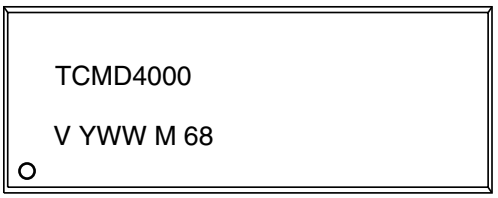


Drawing-No.: 6.544-5330.03-4
Issue: 1; 04.04.00
15226

PACKAGE MARKING



21764-15



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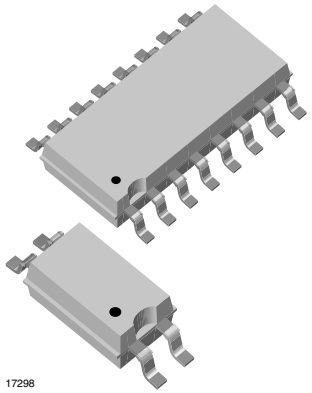
Footprint and Schematic Information for TCMD1000, TCMD4000

The footprint and schematic symbols for the following parts can be accessed using the associated links. They are available in Eagle, Altium, KiCad, OrCAD / Allegro, Pulsonix, and PADS.

Note that the 3D models for these parts can be found on the Vishay product page.

PART NUMBER	FOOTPRINT / SCHEMATIC
TCMD1000	www.snapeda.com/parts/TCMD1000/Vishay/view-part
TCMD4000	www.snapeda.com/parts/TCMD4000/Vishay/view-part

For technical issues and product support, please contact optocoupleranswers@vishay.com.



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