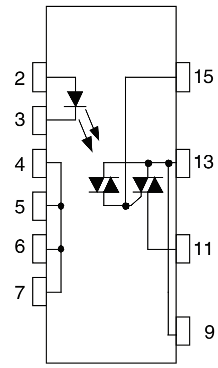
Power Phototriac

Pin	Function
2	LED anode
3	LED cathode
4	N/C
5	N/C
6	N/C
7	N/C
9, 13	Triac T2
11	Triac T1
15	Triac gate



21081

FEATURES

- Maximum trigger current (I_{FT}): 10 mA
- Isolation test voltage 5300 V_{RMS}
- Peak off-state voltage 600 V
- Load current 1 A
- dV/dt of 500 V/µs
- Pure tin leads

Pb
Pb-free

e3
RoHS
COMPLIANT

APPLICATIONS

- Triac driver
- Programable controllers
- AC-output module

DESCRIPTION

The VO3526 is an optically couple phototriac driving a power triac in a DIP-10 (16) package. It provides a 5300 V of input to output isolation.

AGENCY APPROVALS

- UL - E52744 system code H
- CUL - E52744 system code H
- VDE - DIN EN 60747-5-5 (VDE 0884)

ORDER INFORMATION	
PART	**REMARKS**
VO3526	Tubes, DIP-10 (16)

Note
For additional information on the possible lead bend and VDE options refer to option information.

ABSOLUTE MAXIMUM RATINGS (1)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
LED continuous forward current		I_F	50	mA
LED reverse voltage		V_R	5.0	V
OUTPUT				
Repetitive peak off-state voltage	Sine wave, 50 to 60 Hz, gate open	V_{DRM}	600	V
On-state RMS current		$I_{T(RMS)}$	1.0	A
Peak nonrepetitive surge current (50 Hz, peak)		I_{TSM}	10	A
COUPLER				
Total power dissipation		P_{diss}	1.2	W
Ambient temperature range		T_{amb}	- 40 to + 85	°C
Storage temperature range		T_{stg}	- 40 to + 125	°C
Soldering temperature (2)	$t \leq 10$ s max.	T_{sld}	260	°C
Isolation test voltage	for 1.0 s	V_{ISO}	5300	V_{RMS}

Notes
(1) T_{amb} = 25 °C, unless otherwise specified.
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.
(2) Refer to wave profile for soldering conditions for through hole devices.
(3) Total power dissipation value is based on 2S2P PCB. Refer to power phototriac application note for PCB design tips.

ABSOLUTE MAXIMUM RATING CURVES

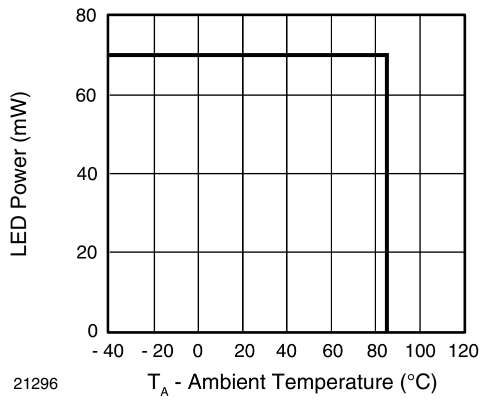


Fig. 1 - Power Dissipation vs. Temperature

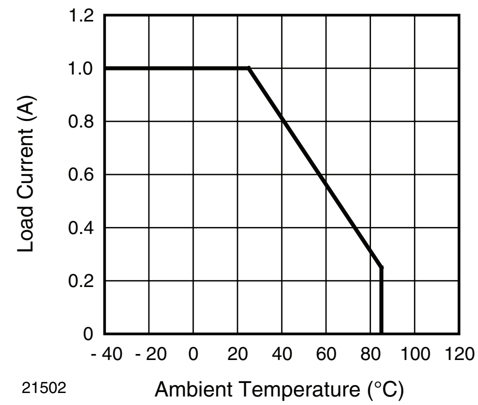


Fig. 2 - Allowable Load Current vs. Ambient Temperature

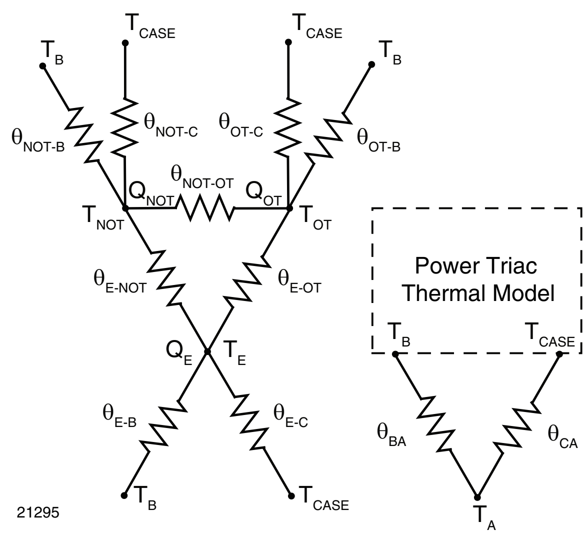
Note

The allowable load current was calculated out under a given operating conditions and only for reference:
LED power: $Q_E = 0.015$ W, θ_{BA} (4-layer) = 30 °C/W

THERMAL CHARACTERISTICS			
PARAMETER	**SYMBOL**	**VALUE**	**UNIT**
Maximum LED junction temperature	$T_{jmax.}$	105	°C
Maximum NOT junction temperature	$T_{jmax.}$	105	°C
Thermal resistance, junction NOT to bord	θ_{NOT-B}	75	°C/W
Thermal resistance, junction NOT to case	θ_{NOT-C}	150	°C/W
Thermal resistance, junction OT to board	θ_{OT-B}	158	°C/W
Thermal resistance, junction OT to case	θ_{OT-C}	157	°C/W
Thermal resistance, junction emitter to board	θ_{E-B}	149	°C/W
Thermal resistance, junction emitter to case	θ_{E-C}	161	°C/W
Thermal resistance, junction NOT to junction OT	θ_{NOT-OT}	243	°C/W
Thermal resistance, junction emitter to junction NOT	θ_{E-NOT}	420	°C/W
Thermal resistance, junction emitter to junction OT	θ_{E-OT}	235	°C/W
Thermal resistance, case to ambient	θ_{CA}	130	°C/W

Note

The thermal model is represented in the thermal network below. Each resistance value given in this model can be used to calculate the temperatures at each node for a given operating condition. The thermal resistance from board to ambient will be dependent on the type of PCB, layout and thickness of copper traces. For a detailed explanation of the thermal model, please reference Vishay's Thermal Characteristics of Power Phototriac application note.



Thermal Model

NOT: Non-opto-triac
OT: Opto-triac
T_B: Board temperature
T_{CASE}: Case temperature
T_A: Ambient temperature
θ_{BA}: Thermal resistance, board to ambient
Q_E: LED power dissipation
Q_{OT}: OT power dissipation
Q_{NOT}: NOT power dissipation

ELECTRICAL CHARACTERISTICS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
LED trigger current	V_T = 6 V	I_{FT}			10	mA
Input reverse current	V_R = 5 V	I_R			10	µA
LED forward voltage	I_F = 10 mA	V_F	0.9		1.4	V
OUTPUT						
Peak on-state voltage	I_{TM} = 1.5 A	V_{TM}			1.7	V
Repetitive peak off-state current	V_{DRM} = 600 V, T_A = 110 °C, 60 Hz	I_{DRM}			100	µA
Holding current	R_L = 100 Ω	I_H			25	mA
Critical rate of rise of off-state voltage	V_{IN} = 400 V (fig. 3)	dV/dt		210		V/µs
Critical rate of rise of commutating voltage	V_{IN} = 240 V_{RMS}, I_T = 1 A_{RMS} (fig. 3)	dV/dt (c)		0.9		V/µs

Note

T_{amb} = 25 °C, unless otherwise specified.
Minimum and maximum values are testing 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.

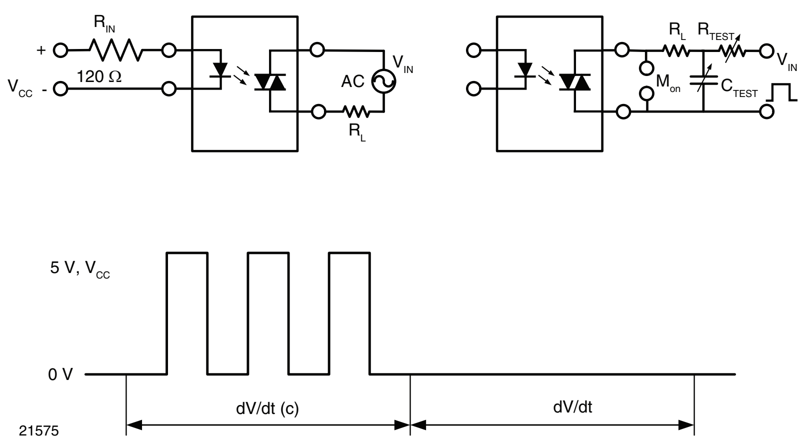


Fig. 3 - dV/dt Test Circuit

RECOMMENDED OPERATING CONDITIONS							
PARAMETER			**TEST CONDITION**	**SYMBOL**	**MIN.**	**MAX.**	**UNIT**
Forward current at on-state		Input		$I_{F(ON)}$	10	20	mA
Forward current at off-state		Input		$I_{F(OFF)}$	0	0.1	mA
Load supply voltage		Output	With snubber (0.022 µF, 47 Ω)	$V_{OUT(RMS)}$		240	V
On-state RMS current	T_A = 40 °C	Output	On 4-layer PCB (R_{BA} = 30 °C/W)	$I_{OUT(RMS)}$		0.8	A
On-state RMS current	T_A = 60 °C	Output	On 4-layer PCB (R_{BA} = 30 °C/W)	$I_{OUT(RMS)}$		0.6	A
Frequency				f	50	60	Hz
Operating temperature					- 40	85	°C

SAFETY AND INSULATION RATINGS							
PARAMETER		**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Climatic classification		IEC 68 part 1			40/85/21		
Pollution degree		DIN VDE 0109			2		
Tracking resistance (comparative tracking index)		Insulation group IIIa	CTI	175			
Highest allowable overvoltage		Transient overvoltage	V_{IOTM}	8000			V_{peak}
Maximum working insulation voltage		Recurring peak voltage	V_{IORM}	890			V_{peak}
Insulation resistance at 25 °C		V_{IO} = 500 V	R_{IS}			$\geq 10^{12}$	Ω
Insulation resistance at T_S		V_{IO} = 500 V	R_{IS}			$\geq 10^{9}$	Ω
Insulation resistance at 100 °C		V_{IO} = 500 V	R_{IS}			$\geq 10^{11}$	Ω
Partial discharge test voltage		Method b, $V_{pd} = V_{IORM} \times 1.6$	V_{pd}			1424	V_{peak}
Safety limiting values - maximum values allowed in the event of a failure	Output power		P_{SO}			2	W
	Input current		I_{SI}			150	mA
	Case temperature		T_{SI}			165	°C
Minimum external air gap (clearance)		Measured from input terminals to output terminals, shortest distance through air		≥ 7			mm
Minimum external tracking (creepage)		Measured from input terminals to output terminals, shortest distance path along body		≥ 7			mm

Note

This phototriac coupler is suitable for 'safe electrical insulation' only within the safety ratings. Compliance with safety ratings shall be ensured by means of protective circuits.

TYPICAL CHARACTERISTICS

T_{amb} = 25 °C, unless otherwise specified

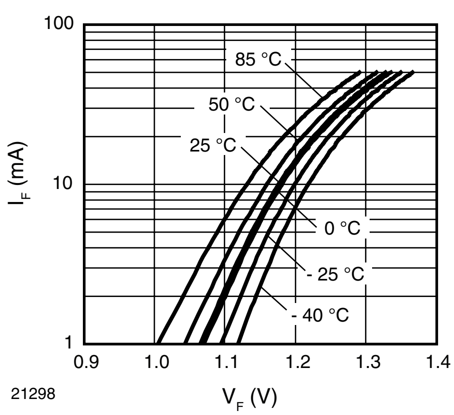


Fig. 4 - Forward Current vs. Forward Voltage

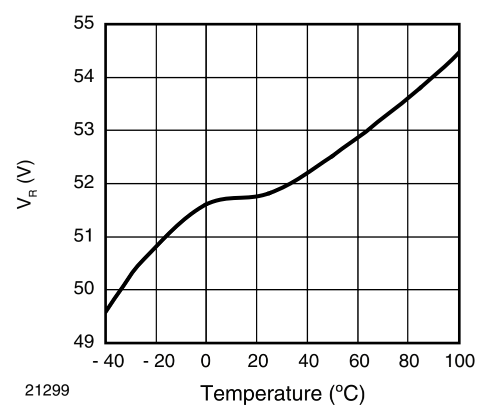


Fig. 5 - Diode Reverse Voltage vs. Temperature

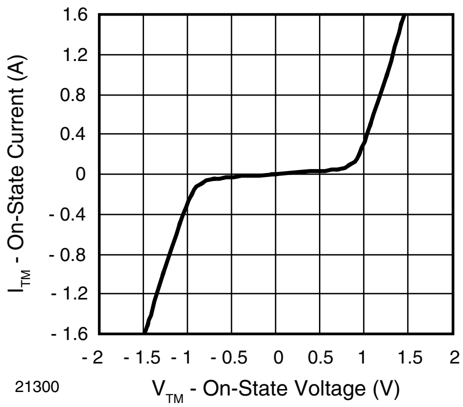


Fig. 6 - On-State Current vs. On State Voltage

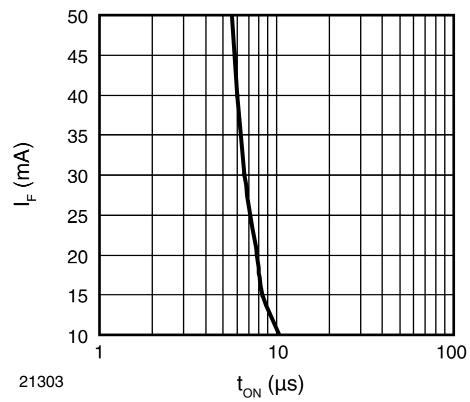


Fig. 9 - Trigger Input Current vs. Turn-on Time

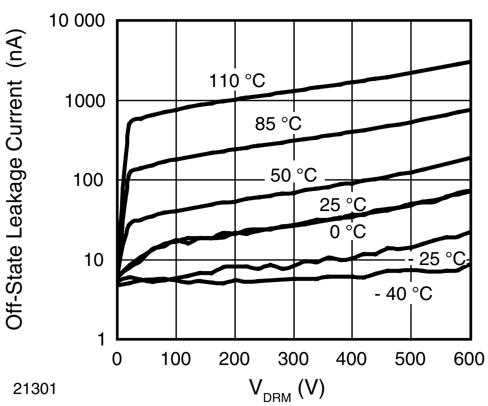


Fig. 7 - Off-State Leakage Current vs. Voltage

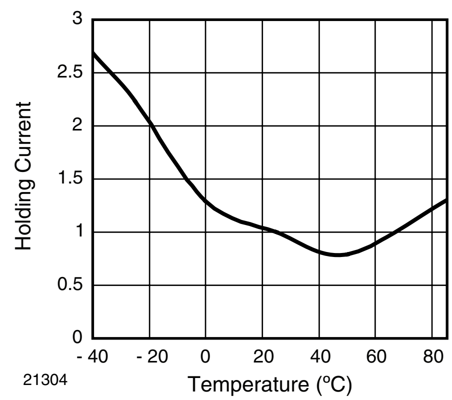


Fig. 10 - Normalized Holding Current vs. Temperature

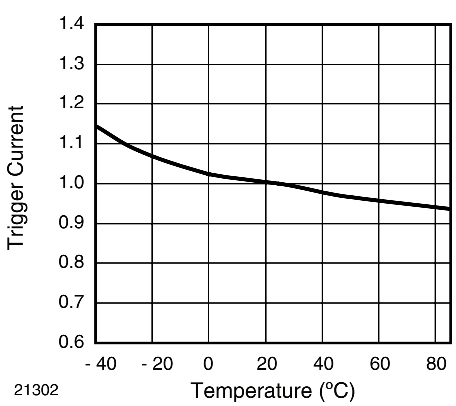


Fig. 8 - Normalized Trigger Input Current vs. Temperature

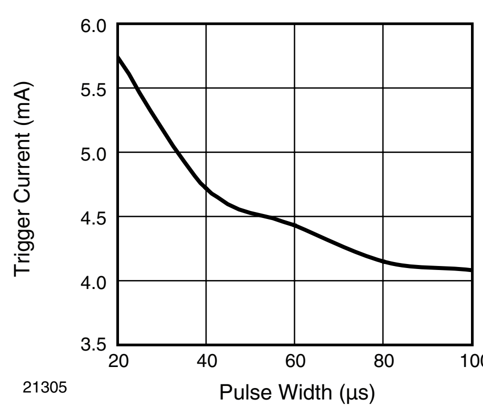


Fig. 11 - Trigger Current vs. Trigger Pulse Width

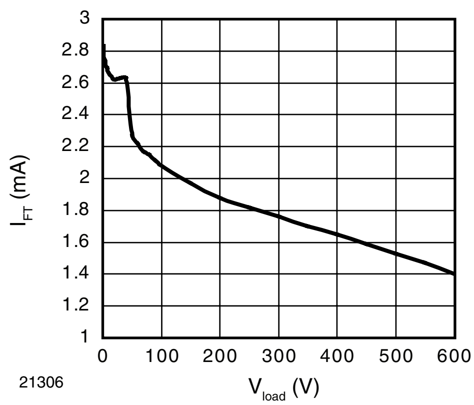
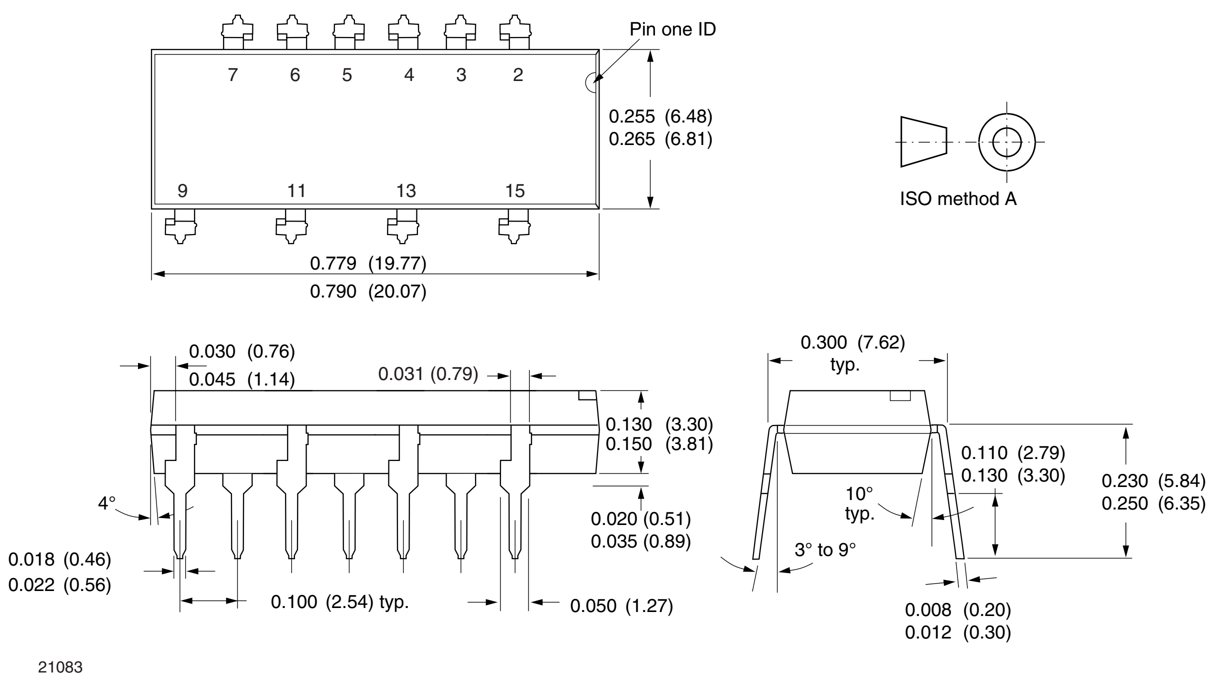


Fig. 12 - Trigger Current vs. V_{load}

PACKAGE DIMENSIONS in inches (millimeters)



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It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively.
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA.
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany

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