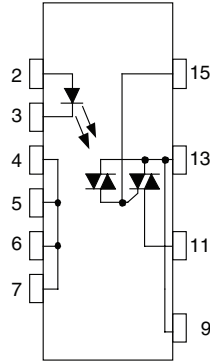


## Power Phototriac

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<sub>RMS</sub>
- Peak off-state voltage 600 V
- Load current 1 A
- dV/dt of 500 V/μs
- Pure tin leads


**RoHS**  
COMPLIANT

### APPLICATIONS

- Triac driver
- Programmable controllers
- AC-output module

### AGENCY APPROVALS

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

### 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.

### 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
<b>INPUT</b>				
LED continuous forward current		$I_F$	50	mA
LED reverse voltage		$V_R$	5.0	V
<b>OUTPUT</b>				
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
<b>COUPLER</b>				
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 <sub>RMS</sub>

#### 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**

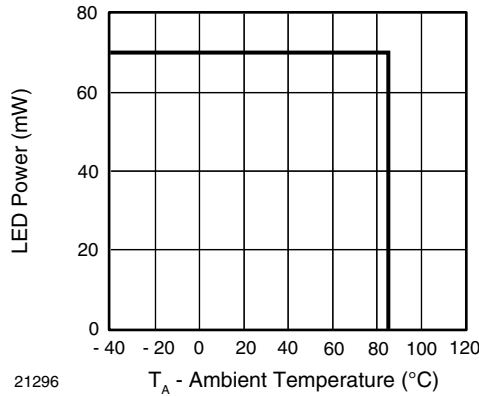


Fig. 1 - Power Dissipation vs. Temperature

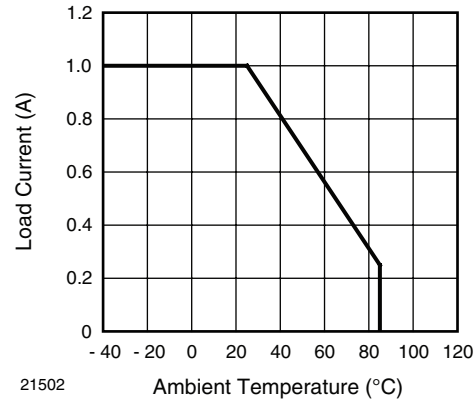


Fig. 2 - Allowable Load Current vs. Ambient Temperature

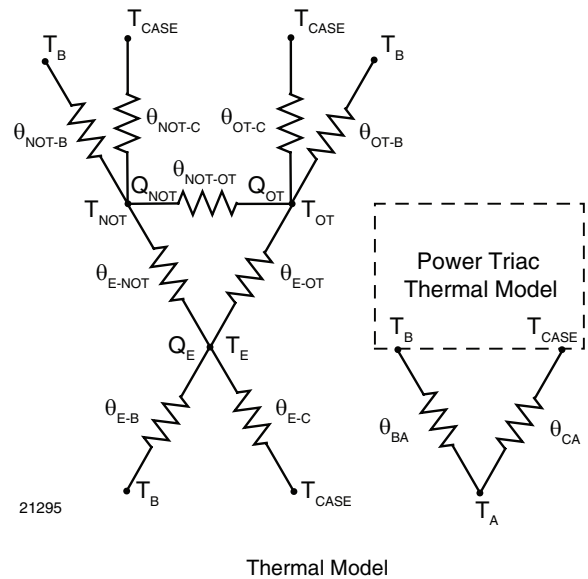
**Note**

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

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

**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.



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

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

**Note**

$T_{amb} = 25\text{ }^\circ\text{C}$ , 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.

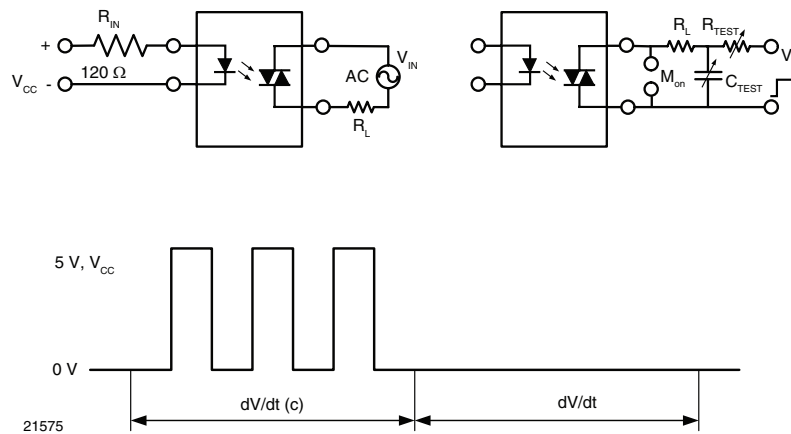


Fig. 3 - dV/dt Test Circuit

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

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	$V_{IO} = 500\text{ V}$	$R_{IS}$			$\geq 10^{12}$	$\Omega$
Insulation resistance at $T_S$	$V_{IO} = 500\text{ V}$	$R_{IS}$			$\geq 10^9$	$\Omega$
Insulation resistance at 100 °C	$V_{IO} = 500\text{ V}$	$R_{IS}$			$\geq 10^{11}$	$\Omega$
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		$\geq 7$			mm
Minimum external tracking (creepage)	Measured from input terminals to output terminals, shortest distance path along body		$\geq 7$			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**

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

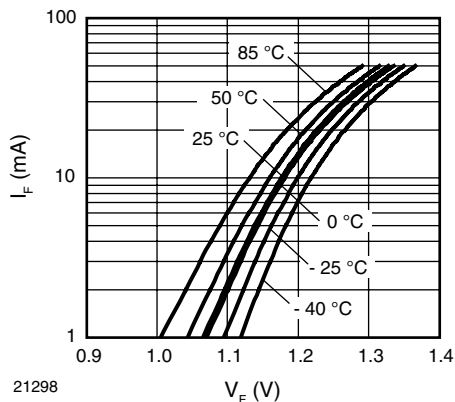


Fig. 4 - Forward Current vs. Forward Voltage

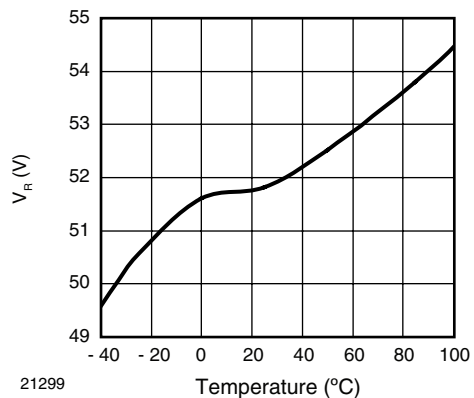


Fig. 5 - Diode Reverse Voltage vs. Temperature

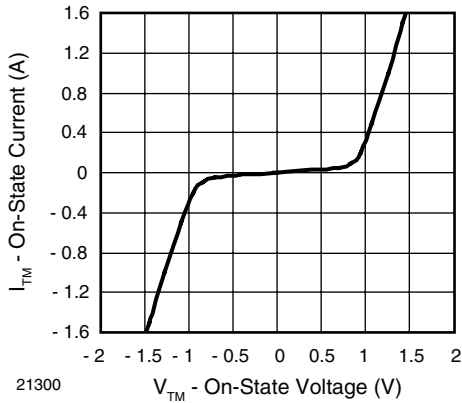


Fig. 6 - On-State Current vs. On State Voltage

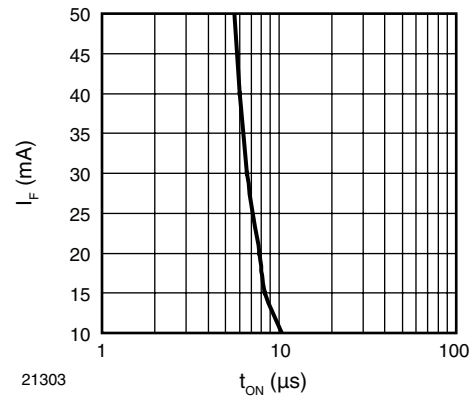


Fig. 9 - Trigger Input Current vs. Turn-on Time

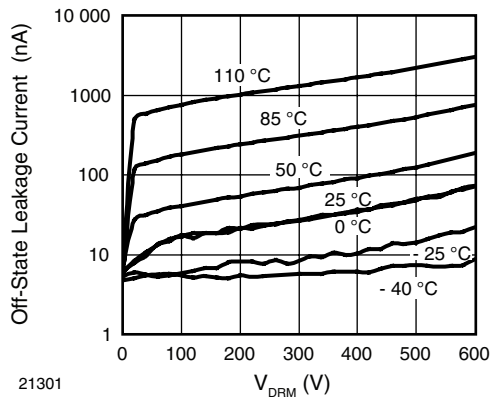


Fig. 7 - Off-State Leakage Current vs. Voltage

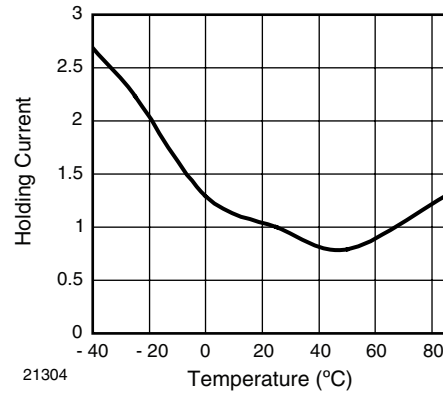


Fig. 10 - Normalized Holding Current vs. Temperature

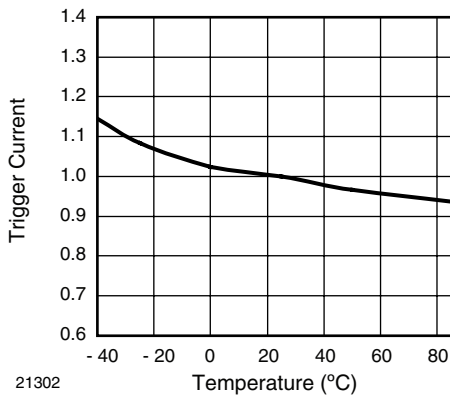


Fig. 8 - Normalized Trigger Input Current vs. Temperature

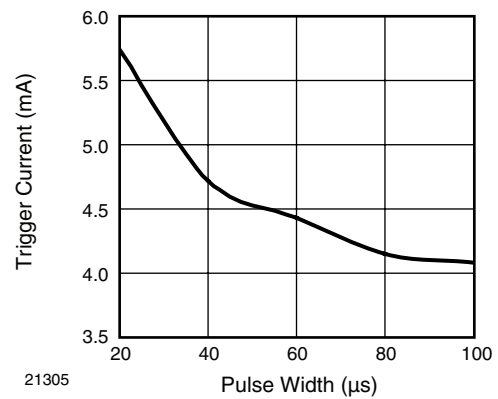


Fig. 11 - Trigger Current vs. Trigger Pulse Width

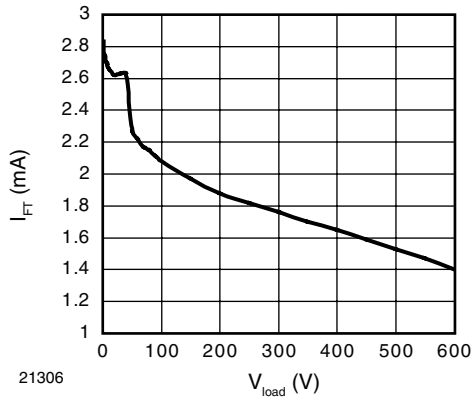
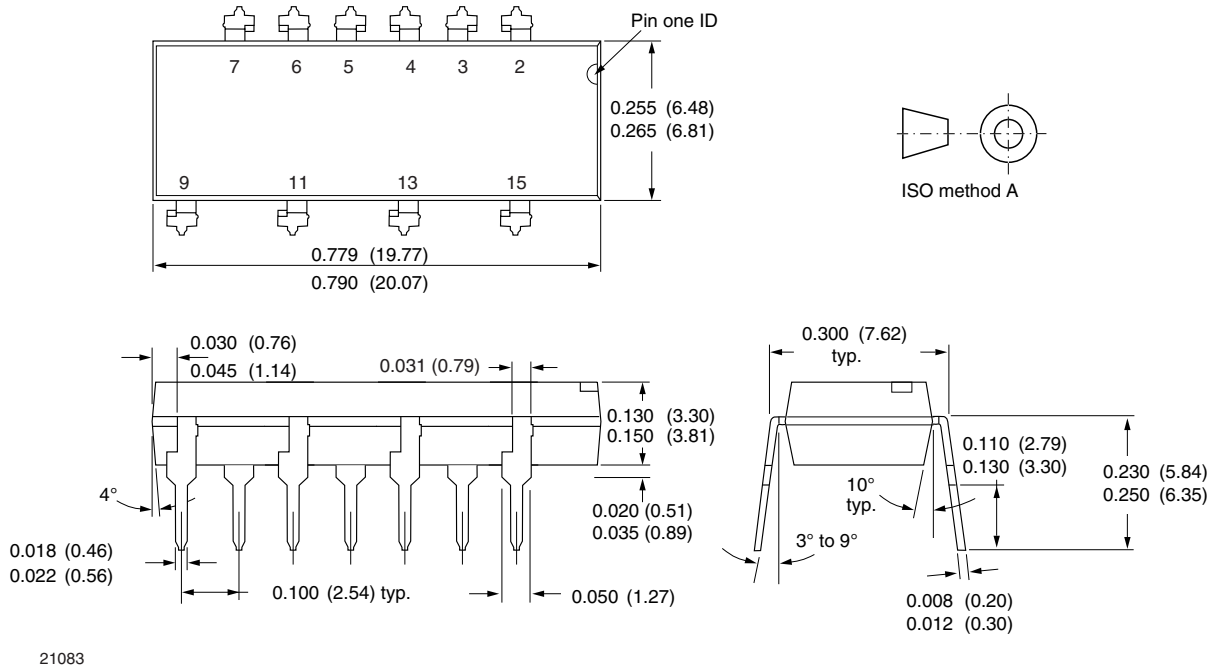


Fig. 12 - Trigger Current vs. V<sub>load</sub>

**PACKAGE DIMENSIONS** in inches (millimeters)



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**OZONE DEPLETING SUBSTANCES POLICY STATEMENT**

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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.

We reserve the right to make changes to improve technical design  
and may do so without further notice.

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