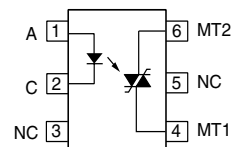
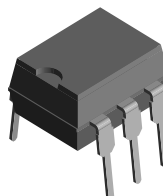


Optocoupler, Phototriac Output, High dV/dt, Low Input Current

Features

- High static dV/dt 5 kV/μs
- High input sensitivity $I_{FT} = 1.6, 2.0,$ and 3.0 mA
- 400 and 600 V blocking voltage
- 300 mA on-state current
- Isolation Test Voltage 5300 V_{RMS}



1179035

Agency Approvals

- UL1577, File No. E52744 System Code H or J, Double Protection
- CUL - File No. E52744, equivalent to CSA bulletin 5A
- DIN EN 60747-5-2 (VDE 0884) Available with Option 1

Applications

- Solid-state relays
- Industrial controls
- Office equipment
- Consumer appliances

Description

The VO4254/VO4256 phototriac consists of a GaAs IRLED optically coupled to a photosensitive non-zero crossing TRIAC packaged in a DIP-6 package.

High input sensitivity is achieved by using an emitter follower phototransistor and a cascaded SCR pre-driver resulting in an LED trigger current of 1.6 mA for bin D, 2.0 mA for bin H, and 3.0 mA for bin M.

The new non zero phototriac family use a proprietary dV/dt clamp resulting in a static dV/dt of greater than 5 kV/μs.

The VO4254/VO4256 phototriac isolates low-voltage logic from 120, 240, and 380 VAC lines to control resistive, inductive, or capacitive loads including motors, solenoids, high current thyristors or TRIAC and relays.

Order Information

Part	Remarks
VO4254D	400 V V _{DRM} , I _{ft} = 1.6 mA, DIP-6
VO4254D-X006	400 V V _{DRM} , I _{ft} = 1.6 mA, DIP-6 400mil
VO4254D-X007	400 V V _{DRM} , I _{ft} = 1.6 mA, SMD-6
VO4254H	400 V V _{DRM} , I _{ft} = 2.0 mA, DIP-6
VO4254H-X006	400 V V _{DRM} , I _{ft} = 2.0 mA, DIP-6 400mil
VO4254H-X007	400 V V _{DRM} , I _{ft} = 2.0 mA, SMD-6
VO4254M	400 V V _{DRM} , I _{ft} = 3.0 mA, DIP-6
VO4254-X006	400 V V _{DRM} , I _{ft} = 3.0 mA, DIP-6 400mil
VO4254M-X007	400 V V _{DRM} , I _{ft} = 3.0 mA, SMD-6
VO4256D	600 V V _{DRM} , I _{ft} = 1.6 mA, DIP-6
VO4256D-X006	600 V V _{DRM} , I _{ft} = 1.6 mA, DIP-6 400mil
VO4256D-X007	600 V V _{DRM} , I _{ft} = 1.6 mA, SMD-6
VO4256H	600 V V _{DRM} , I _{ft} = 2.0 mA, DIP-6
VO4256H-X006	600 V V _{DRM} , I _{ft} = 2.0 mA, DIP-6 400mil
VO4256H-X007	600 V V _{DRM} , I _{ft} = 2.0 mA, SMD-6
VO4256M	600 V V _{DRM} , I _{ft} = 3.0 mA, DIP-6
VO4256M-X006	600 V V _{DRM} , I _{ft} = 3.0 mA, DIP-6 400mil
VO4256M-X007	600 V V _{DRM} , I _{ft} = 3.0 mA, SMD-6

For additional information on the available options refer to Option Information.

Absolute Maximum Ratings

$T_{amb} = 25\text{ }^{\circ}\text{C}$, 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 Rating for extended periods of the time can adversely affect reliability.

Input

Parameter	Test condition	Symbol	Value	Unit
Reverse voltage		V_R	6.0	V
Forward current		I_F	60	mA
Power dissipation		P_{diss}	100	mW
Derate from 25 $^{\circ}\text{C}$			1.33	mW/ $^{\circ}\text{C}$

Output

Parameter	Test condition	Part	Symbol	Value	Unit
Peak off-state voltage		VO4254D/H/M	V_{DRM}	400	V
		VO4256D/H/M	V_{DRM}	600	V
RMS on-state current			I_{TM}	300	mA
Power dissipation			P_{diss}	500	mW
Derate from 25 $^{\circ}\text{C}$				6.6	mW/ $^{\circ}\text{C}$

Coupler

Parameter	Test condition	Symbol	Value	Unit
Isolation test voltage ¹⁾	$t = 1.0\text{ sec.}$	V_{ISO}	5300	V_{RMS}
Storage temperature range		T_{stg}	- 55 to + 150	$^{\circ}\text{C}$
Ambient temperature range		T_{amb}	- 55 to + 100	$^{\circ}\text{C}$
Soldering temperature	max. $\leq 10\text{ sec.}$ dip soldering $\geq 0.5\text{ mm}$ from case bottom	T_{sld}	260	$^{\circ}\text{C}$

¹⁾ between emitter and detector, climate per DIN 50014, part 2, Nov. 74

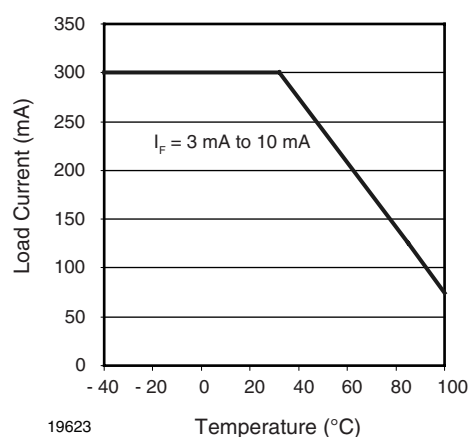
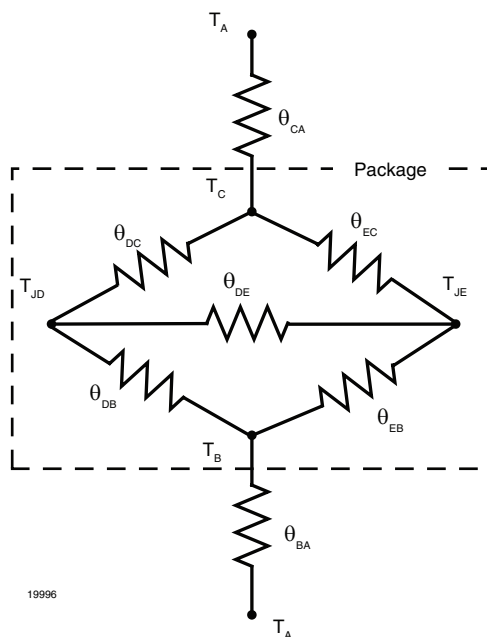


Figure 1. Recommended Operating Condition

Thermal Characteristics

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 Optocouplers Application note.

Parameter	Test condition	Symbol	Value	Unit
LED Power dissipation	at 25 °C	P_{diss}	100	mW
Output Power dissipation	at 25 °C	P_{diss}	500	mW
Total Power dissipation	at 25 °C	P_{tot}	600	mW
Maximum LED junction temperature		T_{jmax}	125	°C
Maximum output die junction temperature		T_{jmax}	125	°C
Thermal resistance, Junction Emitter to Board		θ_{JEB}	150	°C/W
Thermal resistance, Junction Emitter to Case		θ_{JEC}	139	°C/W
Thermal resistance, Junction Detector to Board		θ_{JDB}	78	°C/W
Thermal resistance, Junction Detector to Case		θ_{JDC}	103	°C/W
Thermal resistance, Junction Emitter to Junction Detector		θ_{JED}	496	°C/W
Thermal resistance, Case to Ambient		θ_{CA}	3563	°C/W



Electrical Characteristics

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

Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.

Input

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Forward voltage	$I_F = 10\text{ mA}$	V_F		1.2	1.4	V
Reverse current	$V_R = 6.0\text{ V}$	I_R		0.1	10	μA
Input capacitance	$V_F = 0\text{ V}$, $f = 1.0\text{ MHz}$	C_I		40		pF

Output

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Repetitive peak off-state voltage	$I_{\text{DRM}} = 100 \mu\text{s}$	VO4254D/H/M	V_{DRM}	400			V
		VO4256D/H/M	V_{DRM}	600			V
Off-state current	$V_{\text{D}} = V_{\text{DRM}}$		I_{DRM}			100	μA
On-state voltage	$I_{\text{T}} = 300 \text{ mA}$		V_{TM}			3.0	V
On-current	$\text{PF} = 1.0$, $V_{\text{T(RMS)}} = 1.7 \text{ V}$		I_{TM}			300	mA
Critical state of rise off-state voltage	$V_{\text{D}} = 0.67 V_{\text{DRM}}$, $T_{\text{J}} = 25 \text{ }^{\circ}\text{C}$		dV/dt_{cr}	5000			V/ μs

Coupler

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
LED trigger current, current required to latch output	$V_{\text{D}} = 3 \text{ V}$	VO4254D	I_{FT}			1.6	mA
		VO4254H	I_{FT}			2.0	mA
		VO4254M	I_{FT}			3.0	mA
		VO4256D	I_{FT}			1.6	mA
		VO4256H	I_{FT}			2.0	mA
		VO4256M	I_{FT}			3.0	mA
Capacitance (input-output)	$f = 1.0 \text{ MHz}$, $V_{\text{IO}} = 0 \text{ V}$	C_{IO}	C_{IO}		0.8		pF

Safety and Insulation Ratings

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Climatic Classification (according to IEC 68 part 1)				55/100/21		
Polution Degree (DIN VDE 0109)				2.0		
Comparative tracking index per DIN IEC 112/VDE 0303 part 1, group IIIa per DIN VDE 6110 175 399			175		399	
V_{IOTM}		V_{IOTM}	8000			V
V_{IORM}		V_{IORM}	890			V
P_{SO}		P_{SO}			500	mW
I_{SI}		I_{SI}			250	mA
T_{SI}		T_{SI}			175	$^{\circ}\text{C}$
Creepage			7.0			mm
Clearance			7.0			mm

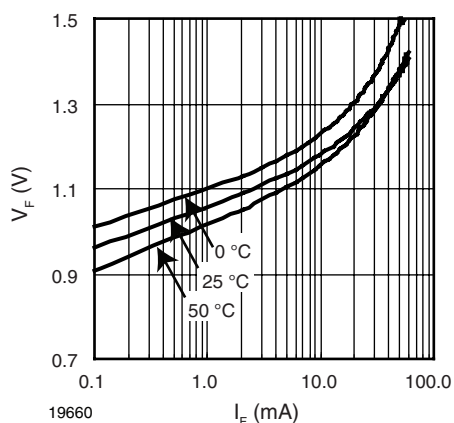


Figure 2. Diode Forward Voltage vs. Forward Current

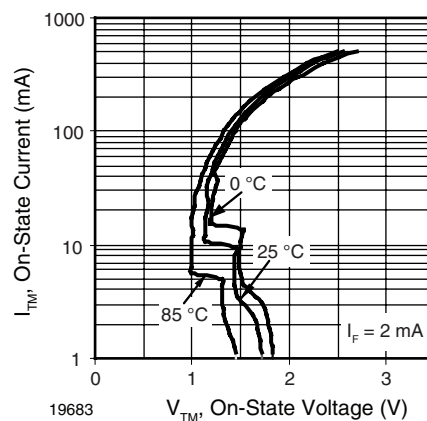


Figure 5. On State Current vs. On State Voltage

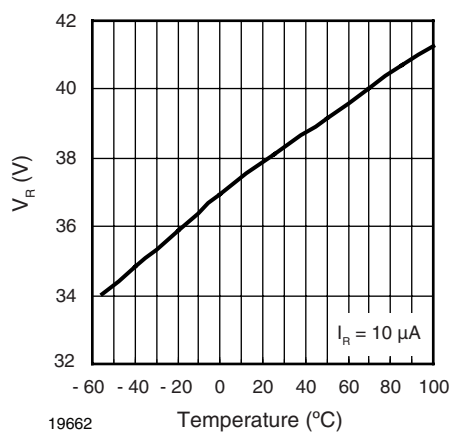


Figure 3. Diode Reverse Voltage vs. Temperature

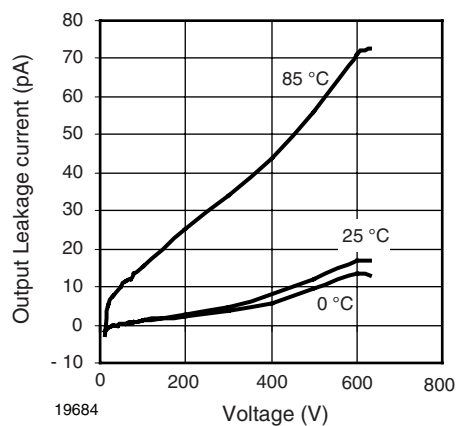


Figure 6. Output Off Current (leakage) vs. Voltage

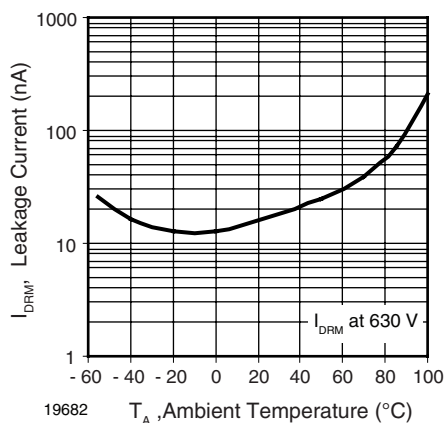


Figure 4. Leakage Current vs. Ambient Temperature

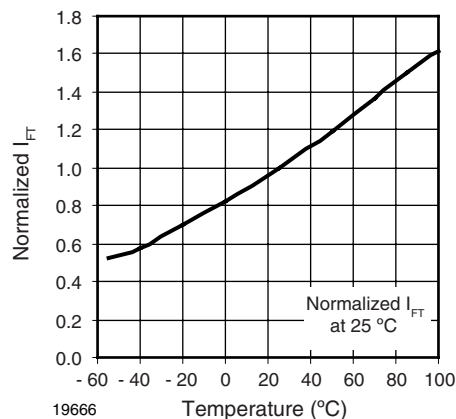


Figure 7. Normalize Trigger Input Current vs. Temperature

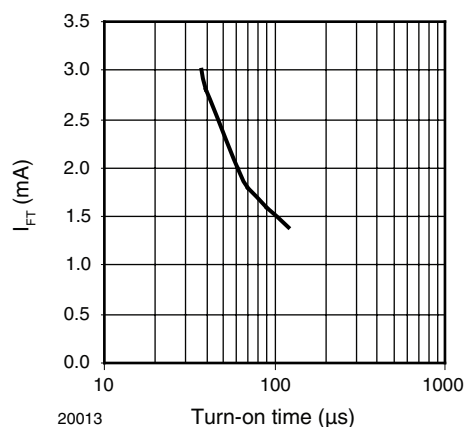


Figure 8. I_{FT} vs. Turn-on time (μs)

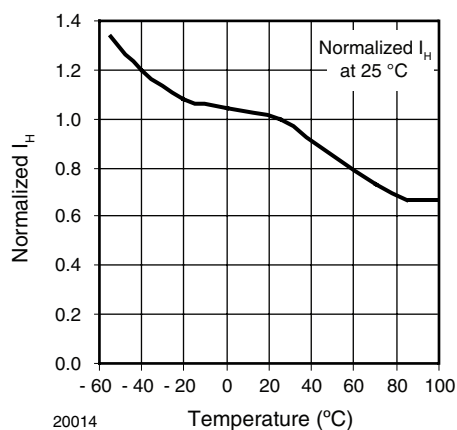


Figure 9. Normalized I_H vs. Temperature

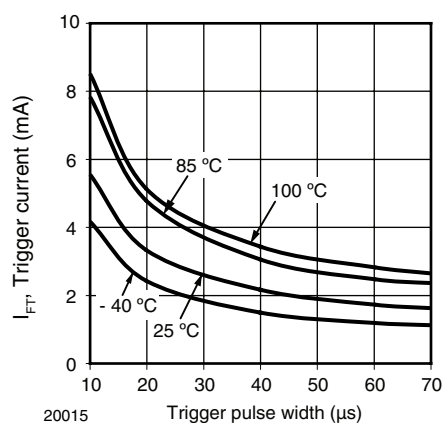
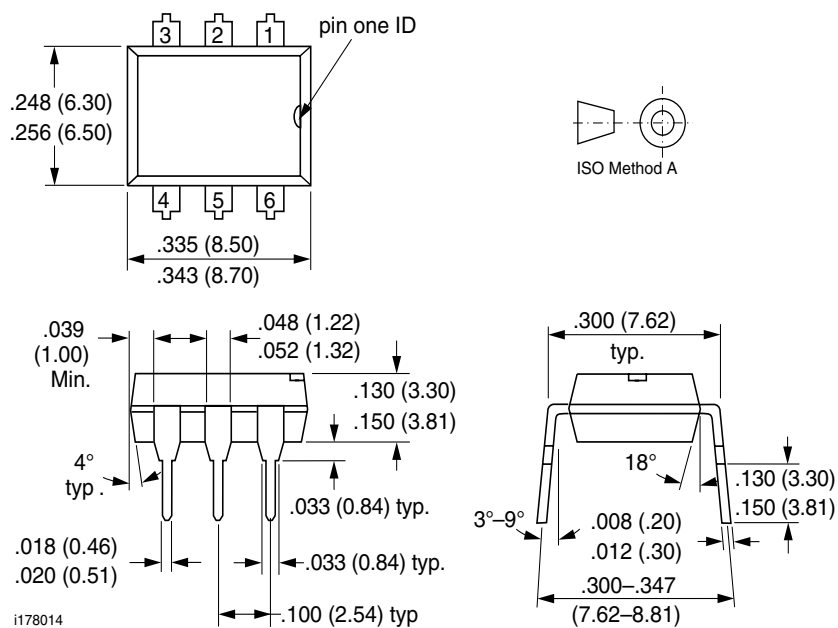
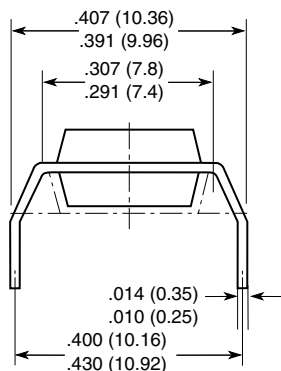


Figure 10. I_{FT} vs. LED pulse width

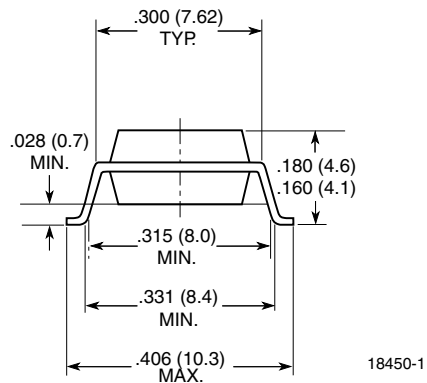
Package Dimensions in Inches (mm)



Option 6



Option 7



Ozone Depleting Substances Policy Statement

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.

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

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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



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