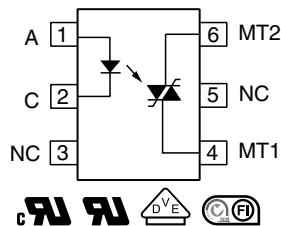


## Optocoupler, Phototriac Output, High dV/dt, Low Input Current



23165


**RoHS**  
COMPLIANT

### FEATURES

- High static  $dV/dt$  5 kV/ $\mu$ s
- High input sensitivity  $I_{FT} = 1.6$  mA, 2 mA, and 3 mA
- 700 and 800 V blocking voltage
- 300 mA on-state current
- Isolation rated voltage 4420 V<sub>RMS</sub>
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

### LINKS TO ADDITIONAL RESOURCES



### DESCRIPTION

The VO4257 and VO4258 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 predriver resulting in an LED trigger current of 1.6 mA for bin D, 2 mA for bin H, and 3 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/ $\mu$ s.

The VO4257, VO4258 phototriac isolates low-voltage logic from 120 VAC, 240 VAC, and 380 VAC lines to control resistive, inductive, or capacitive loads including motors, solenoids, high current thyristors or TRIAC and relays.

### APPLICATIONS

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

### AGENCY APPROVALS

- [UL](#)
- [cUL](#)
- [DIN EN 60747-5-5 \(VDE 0884-5\)](#), available with option 1
- [FIMKO](#)

### ORDERING INFORMATION

<table border="1"> <tr> <td>V</td><td>O</td><td>4</td><td>2</td><td>5</td><td>#</td><td>X</td><td>-</td><td>X</td><td>0</td><td>0</td><td>#</td><td>T</td></tr> </table>													V	O	4	2	5	#	X	-	X	0	0	#	T	
V	O	4	2	5	#	X	-	X	0	0	#	T														
PART NUMBER						PACKAGE OPTION						TAPE AND REEL														
<b><math>V_{DRM}</math> 700</b>						<b><math>V_{DRM}</math> 800</b>																				
TRIGGER CURRENT, $I_{FT}$ (mA)																										
<b>AGENCY CERTIFIED / PACKAGE</b>	<b>3</b>	<b>1.6</b>	<b>2</b>	<b>3</b>																						
UL, cUL, BSI, FIMKO	VO4257M	VO4258D	VO4258H	VO4258M																						
DIP-6	-	-	VO4258H-X006	-																						
DIP-6, 400 mil, option 6	-	VO4258D-X007T	VO4258H-X007T	VO4258M-X007T																						
SMD-6, option 7	3	1.6	2	3																						
<b>VDE, UL, cUL, BSI, FIMKO</b>	<b>3</b>	<b>1.6</b>	<b>2</b>	<b>3</b>																						
SMD-6, option 7	-	-	-	-																						

<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25 \text{ }^{\circ}\text{C}$ , unless otherwise specified)					
PARAMETER	TEST CONDITION	PART	SYMBOL	VALUE	UNIT
<b>INPUT</b>					
Reverse voltage			$V_R$	6	V
Forward current			$I_F$	60	mA
Derate from $25 \text{ }^{\circ}\text{C}$				1.33	$\text{mW}/\text{ }^{\circ}\text{C}$
<b>OUTPUT</b>					
Peak off-state voltage		VO4257D/H/M	$V_{DRM}$	700	V
		VO4258D/H/M	$V_{DRM}$	800	V
RMS on-state current			$I_{TM}$	300	mA
Derate from $25 \text{ }^{\circ}\text{C}$				6.6	$\text{mW}/\text{ }^{\circ}\text{C}$
<b>COUPLER</b>					
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. $\leq 10 \text{ s}$ dip soldering $\geq 0.5 \text{ mm}$ from case bottom		$T_{sld}$	260	$^{\circ}\text{C}$

**Note**

- 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

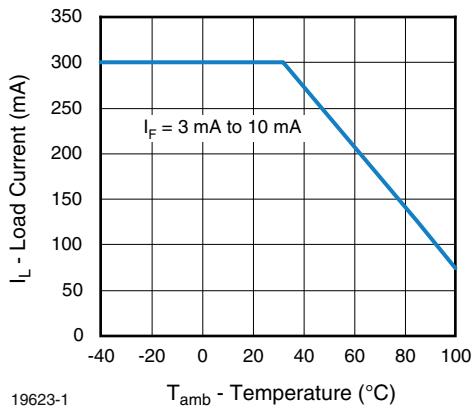
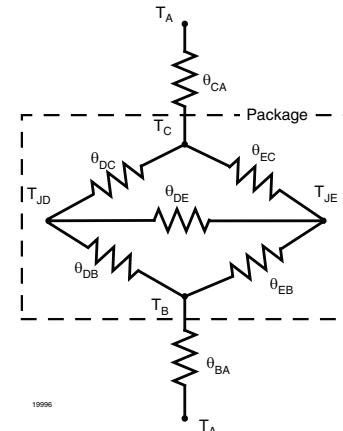


Fig. 1 - Recommended Operating Condition

**THERMAL CHARACTERISTICS**

PARAMETER	SYMBOL	VALUE	UNIT
LED power dissipation	$P_{diss}$	100	mW
Output power dissipation	$P_{diss}$	500	mW
Total power dissipation	$P_{tot}$	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	$\theta_{JEB}$	150	°C/W
Thermal resistance, junction emitter to case	$\theta_{JEC}$	139	°C/W
Thermal resistance, junction detector to board	$\theta_{JDB}$	78	°C/W
Thermal resistance, junction detector to case	$\theta_{JDC}$	103	°C/W
Thermal resistance, junction emitter to junction detector	$\theta_{JED}$	496	°C/W
Thermal resistance, case to ambient	$\theta_{CA}$	3563	°C/W


**Note**

- The thermal characteristics table above were measured at 25 °C and 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

**ELECTRICAL CHARACTERISTICS (T<sub>amb</sub> = 25 °C, unless otherwise specified)**

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>							
Forward voltage	$I_F = 10 \text{ mA}$		$V_F$	-	1.2	1.4	V
Reverse current	$V_R = 6 \text{ V}$		$I_R$	-	0.1	10	μA
Input capacitance	$V_F = 0 \text{ V}, f = 1 \text{ MHz}$		$C_I$	-	40	-	pF
<b>OUTPUT</b>							
Repetitive peak off-state voltage	$I_{DRM} = 100 \text{ μA}$	VO4257D/H/M	$V_{DRM}$	700	-	-	V
		VO4258D/H/M	$V_{DRM}$	800	-	-	V
Off-state current	$V_D = V_{DRM}$		$I_{DRM}$	-	-	100	μA
On-state voltage	$I_T = 300 \text{ mA}$		$V_{TM}$	-	-	3	V
On-current	$PF = 1, V_{T(RMS)} = 1.7 \text{ V}$		$I_{TM}$	-	-	300	mA
Critical state of rise of off-state voltage	$V_D = 0.67 V_{DRM}, T_J = 25 \text{ °C}$		$dV/dt_{cr}$	5000	-		V/μs
<b>COUPLER</b>							
LED trigger current, current required to latch output	$V_D = 3 \text{ V}$	VO4257D	$I_{FT}$	-	-	1.6	mA
		VO4257H	$I_{FT}$	-	-	2	mA
		VO4257M	$I_{FT}$	-	-	3	mA
		VO4258D	$I_{FT}$	-	-	1.6	mA
		VO4258H	$I_{FT}$	-	-	2	mA
		VO4258M	$I_{FT}$	-	-	3	mA
Capacitance (input to output)	$f = 1 \text{ MHz}, V_{IO} = 0 \text{ V}$		$C_{IO}$	-	0.8	-	pF

**Note**

- Minimum and maximum values were tested 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

SAFETY AND INSULATION RATINGS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	According to IEC 68 part 1		55 / 100 / 21	
Comparative tracking index		CTI	175	
Maximum rated withstanding isolation voltage	$t = 1 \text{ min}$	$V_{\text{ISO}}$	4420	$V_{\text{RMS}}$
Maximum transient isolation voltage		$V_{\text{IOTM}}$	8000	$V_{\text{peak}}$
Maximum repetitive peak isolation voltage		$V_{\text{IORM}}$	890	$V_{\text{peak}}$
Isolation resistance	$V_{\text{IO}} = 500 \text{ V}, T_{\text{amb}} = 25 \text{ }^{\circ}\text{C}$	$R_{\text{IO}}$	$\geq 10^{12}$	$\Omega$
	$V_{\text{IO}} = 500 \text{ V}, T_{\text{amb}} = 100 \text{ }^{\circ}\text{C}$	$R_{\text{IO}}$	$\geq 10^{11}$	$\Omega$
Output safety power		$P_{\text{SO}}$	500	mW
Input safety current		$I_{\text{SI}}$	250	mA
Safety temperature		$T_{\text{S}}$	175	$^{\circ}\text{C}$
Creepage distance			$\geq 7$	mm
Clearance distance			$\geq 7$	mm
Insulation thickness		DTI	$\geq 0.4$	mm
Pollution degree (DIN VDE 0109)			2	

**Note**

- As per IEC 60747-5-5, § 7.4.3.8.2, 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** ( $T_{\text{amb}} = 25 \text{ }^{\circ}\text{C}$ , unless otherwise specified)

Fig. 3 - Diode Reverse Voltage vs. Temperature

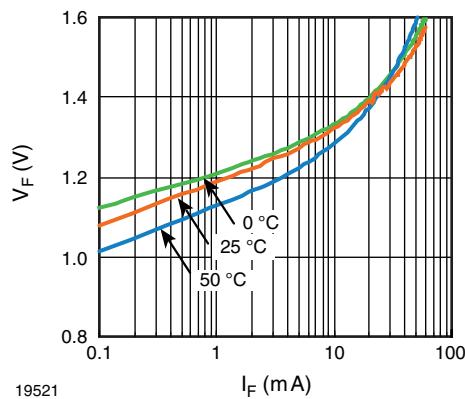


Fig. 2 - Diode Forward Voltage vs. Forward Current

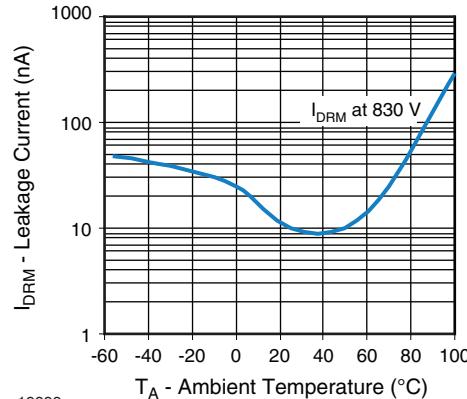
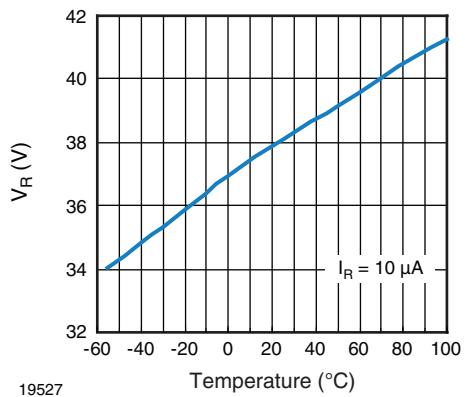


Fig. 4 - Leakage Current vs. Ambient Temperature



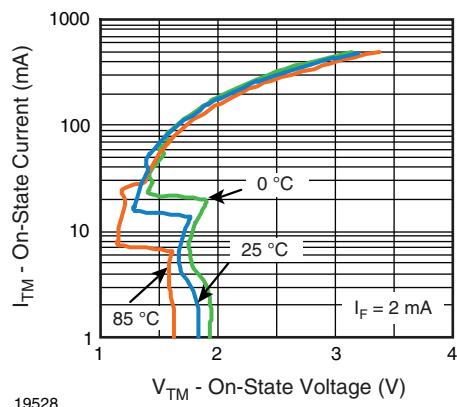


Fig. 5 - Output On Current ( $I_{TM}$ ) vs. Voltage

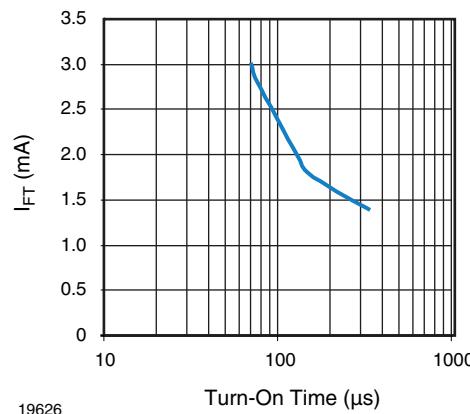


Fig. 8 - Trigger Current vs. Turn-On Time

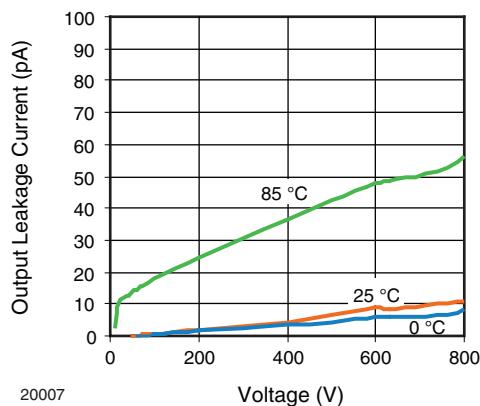


Fig. 6 - Output Off Current (Leakage) vs. Voltage

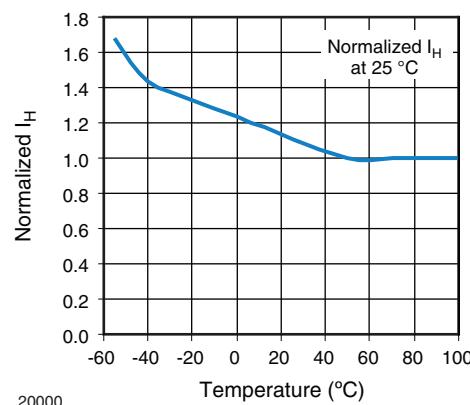


Fig. 9 - Normalized Holding Current vs. Temperature

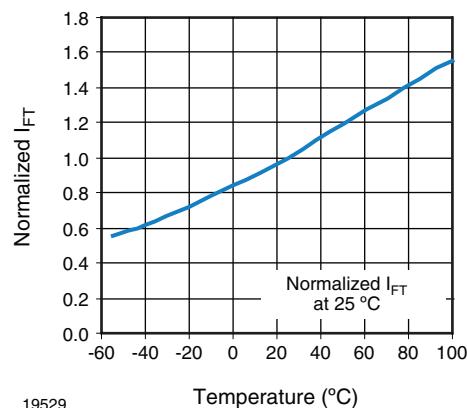


Fig. 7 - Normalized Trigger Input Current vs. Temperature

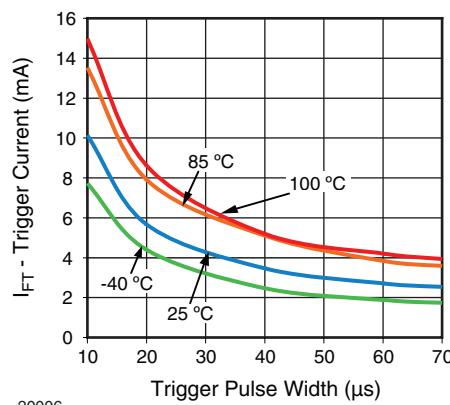
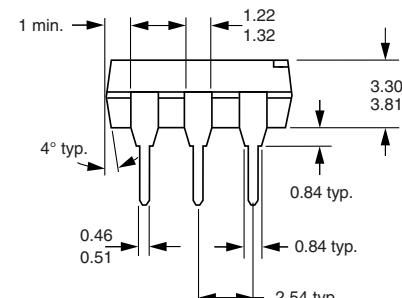
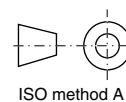
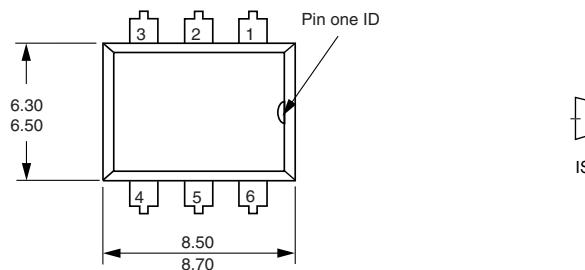
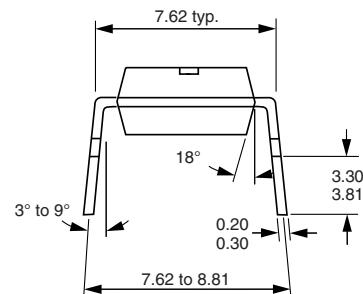
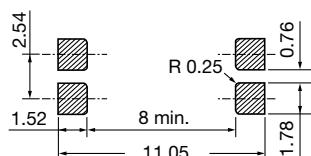
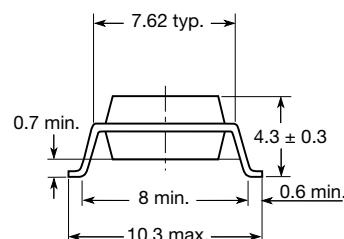
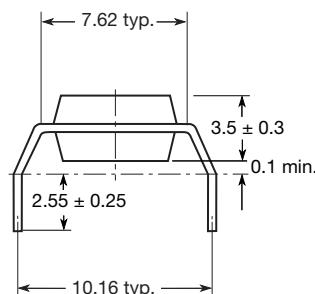


Fig. 10 -  $I_{FT}$  vs. LED Pulse Width

**PACKAGE DIMENSIONS** in millimeters

**Option 6**

**Option 7**


20802-18

**PACKAGE MARKING** (example)

**Note**

- VDE logo is only marked on option 1 parts. Tape and reel suffix (T) is not part of the package marking

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