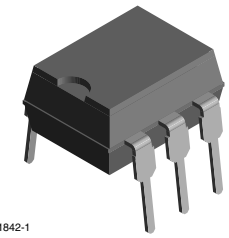
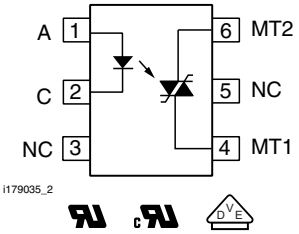
Optocoupler, Phototriac Output, High dV/dt, Low Input Current





FEATURES

- High static dV/dt 5 kV/µs
- 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_{RMS}
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

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/µs.

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

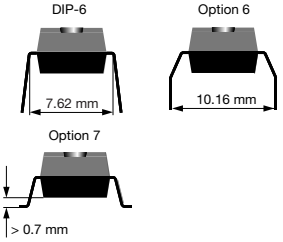
AGENCY APPROVALS

- UL1577, file no. E52744, double protection
- cUL - file no. E52744, equivalent to CSA bulletin 5A
- DIN EN 60747-5-5 (VDE 0884-5), available with option 1

ORDERING INFORMATION

V	O	4	2	5	#	X	-	X	0	0	#	T

PART NUMBER — PACKAGE OPTION — TAPE AND REEL



AGENCY CERTIFIED/PACKAGE	V_{DRM} 700			V_{DRM} 800		
	TRIGGER CURRENT, I_{FT} (mA)					
UL, cUL, BSI, FIMKO	**1.6**	**2**	**3**	**1.6**	**2**	**3**
DIP-6	VO4257D	VO4257H	VO4257M	VO4258D	VO4258H	VO4258M
DIP-6, 400 mil, option 6	VO4257D-X006	VO4257H-X006	VO4257M-X006	VO4258D-X006	VO4258H-X006	VO4258M-X006
SMD-6, option 7	VO4257D-X007T	VO4257H-X007T	VO4257M-X007T	VO4258D-X007T	VO4258H-X007T	VO4258M-X007T
VDE, UL, cUL, BSI, FIMKO	**1.6**	**2**	**3**	**1.6**	**2**	**3**
SMD-6, option 7	-	-	-	-	VO4258H-X017T	-

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)					
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**VALUE**	**UNIT**
INPUT					
Reverse voltage			V_R	6	V
Forward current			I_F	60	mA
Derate from 25 °C				1.33	mW/°C
OUTPUT					
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 °C				6.6	mW/°C
COUPLER					
Storage temperature range			T_{stg}	-55 to +150	°C
Ambient temperature range			T_{amb}	-55 to +100	°C
Soldering temperature	Max. ≤ 10 s dip soldering ≥ 0.5 mm from case bottom		T_{sld}	260	°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

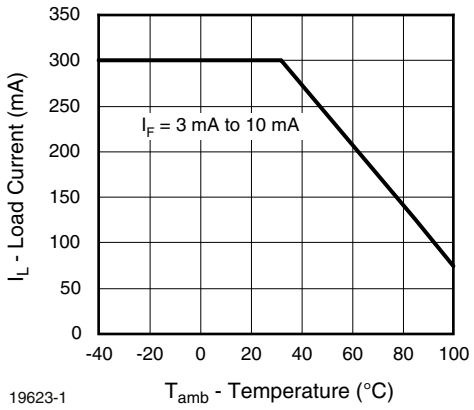
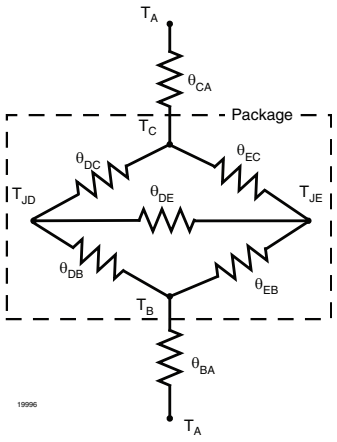


Fig. 1 - Recommended Operating Condition

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	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



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_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT							
Forward voltage	I_F = 10 mA		V_F		1.2	1.4	V
Reverse current	V_R = 6 V		I_R		0.1	10	µA
Input capacitance	V_F = 0 V, f = 1 MHz		C_I		40		pF
OUTPUT							
Repetitive peak off-state voltage	I_{DRM} = 100 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 mA		V_{TM}			3	V
On-current	PF = 1, $V_{T(RMS)}$ = 1.7 V		I_{TM}			300	mA
Critical state of rise of off-state voltage	V_D = 0.67 V_{DRM}, T_J = 25 °C		dV/dt_{cr}	5000			V/µs
COUPLER							
LED trigger current, current required to latch output	V_D = 3 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 MHz, V_{IO} = 0 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 min	V_{ISO}	4420	V_{RMS}
Maximum transient isolation voltage		V_{IOTM}	8000	V_{peak}
Maximum repetitive peak isolation voltage		V_{IORM}	890	V_{peak}
Isolation resistance	V_{IO} = 500 V, T_{amb} = 25 °C	R_{IO}	$\geq 10^{12}$	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	$\geq 10^{11}$	Ω
Output safety power		P_{SO}	500	mW
Input safety current		I_{SI}	250	mA
Safety temperature		T_S	175	°C
Creepage distance			≥ 7	mm
Clearance distance			≥ 7	mm
Insulation thickness		DTI	≥ 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_{amb} = 25 °C, unless otherwise specified)

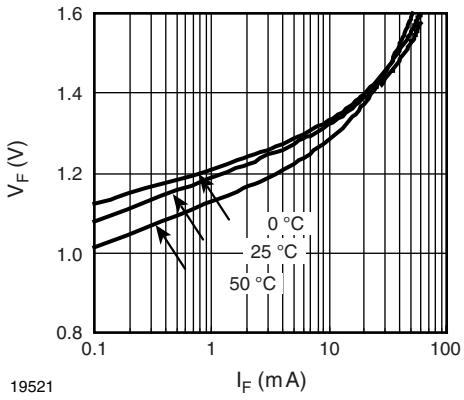


Fig. 2 - Diode Forward Voltage vs. Forward Current

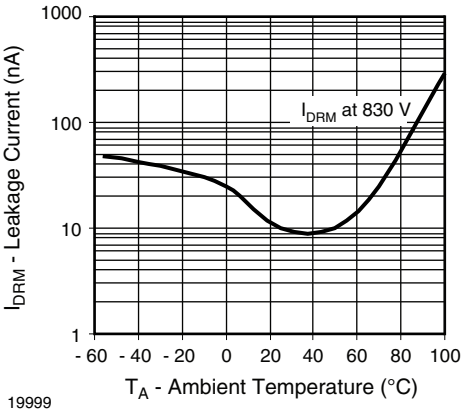


Fig. 4 - Leakage Current vs. Ambient Temperature

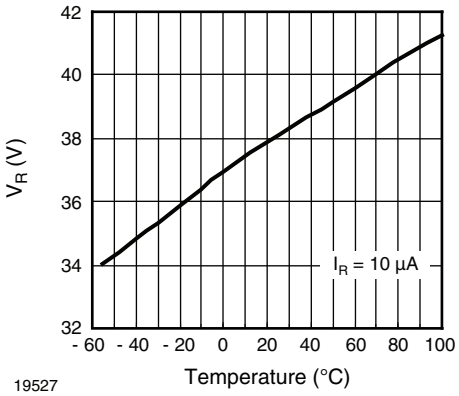


Fig. 3 - Diode Reverse Voltage vs. Temperature

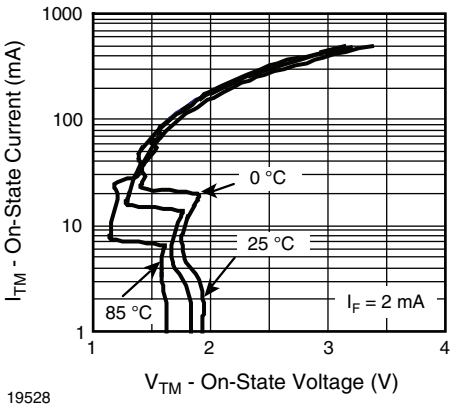


Fig. 5 - Output On Current (I_{TM}) vs. Voltage

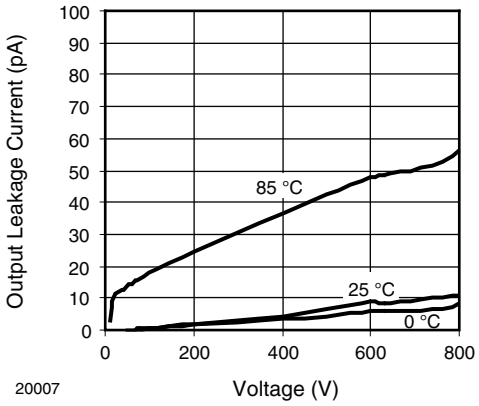


Fig. 6 - Output Off Current (Leakage) vs. Voltage

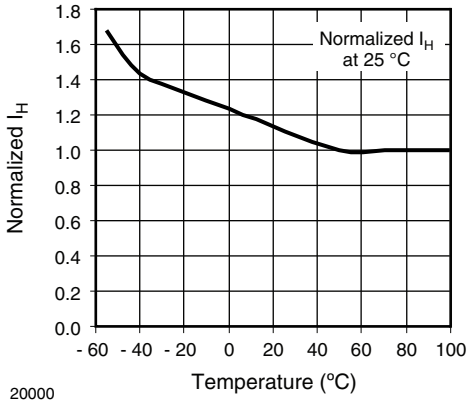


Fig. 9 - Normalized Holding Current vs. Temperature

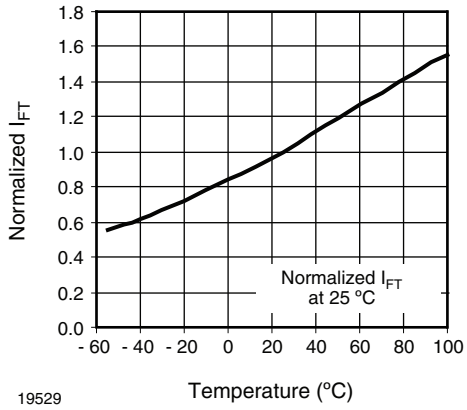


Fig. 7 - Normalized Trigger Input Current vs. Temperature

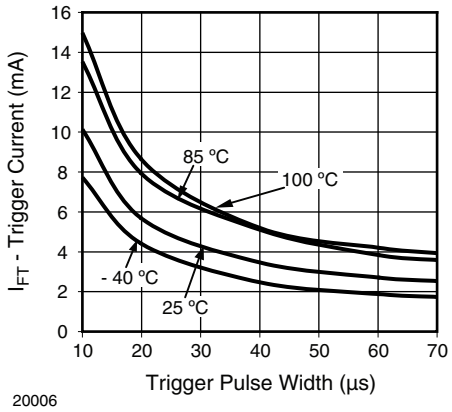


Fig. 10 - I_{FT} vs. LED Pulse Width

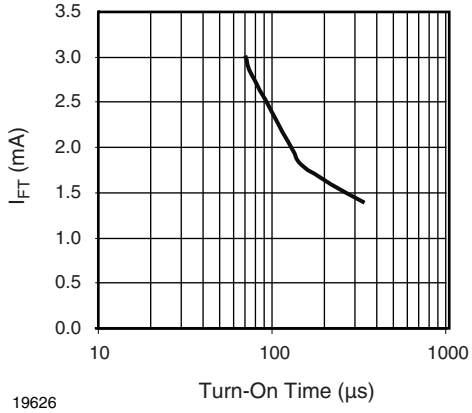
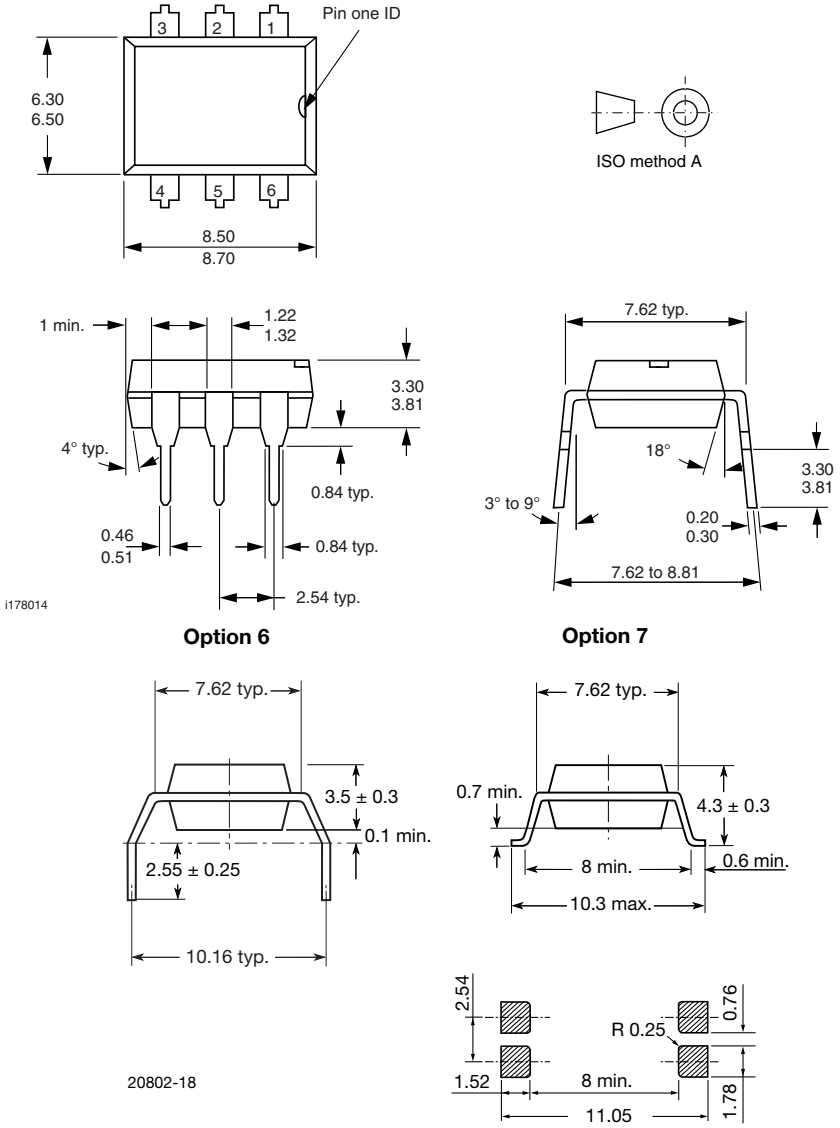
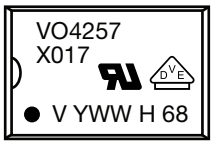


Fig. 8 - Trigger Current vs. Turn-On Time

PACKAGE DIMENSIONS in millimeters



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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