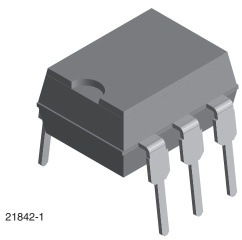
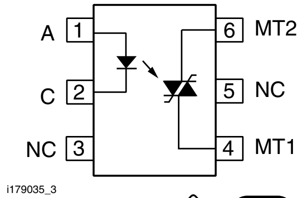
Optocoupler, Phototriac Output, High dV/dt, Low Input Current





DESCRIPTION

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

FEATURES

- High static dV/dt 5 kV/μs
- High input sensitivity 1.6 mA, 2 mA, and 3 mA
- 400 V and 600 V blocking voltage
- 300 mA on-state current
- Isolation test voltage 5300 V_{RMS}
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

APPLICATIONS

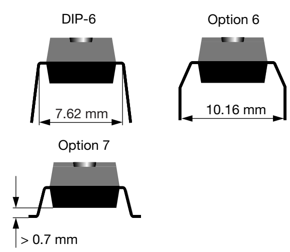
- Solid-state relays
- Industrial controls
- Office equipment
- Consumer appliances

AGENCY APPROVALS

- UL1577, file no. E52744 system code H or J, double protection
- cUL - file no. E52744, equivalent to CSA bulletin 5A
- DIN EN 60747-5-5 (VDE 0884) available with option 1
- FIMKO: FI25250

ORDERING INFORMATION

V	O	4	2	5	#	X	-	X	0	0	#	T
PART NUMBER								PACKAGE OPTION				TAPE AND REEL



AGENCY CERTIFIED/PACKAGE	V_{DRM} 400			V_{DRM} 600		
	TRIGGER CURRENT, I_{FT} (mA)					
UL, cUL, FIMKO	**1.6**	**2**	**3**	**1.6**	**2**	**3**
DIP-6	VO4254D	VO4254H	VO4254M	VO4256D	VO4256H	VO4256M
DIP-6, 400 mil, option 6	VO4254D-X006	VO4254H-X006	VO4254M-X006	VO4256D-X006	VO4256H-X006	VO4256M-X006
SMD-6, option 7	VO4254D-X007T	VO4254H-X007T	VO4254M-X007T	VO4256D-X007T	VO4256H-X007T	VO4256M-X007T
UL, cUL, FIMKO, VDE	**1.6**	**2**	**3**	**1.6**	**2**	**3**
DIP-6	-	-	-	VO4256D-X001	-	-

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
Power dissipation			P_{diss}	100	mW
Derate from 25 °C				1.33	mW/°C
OUTPUT					
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 °C				6.6	mW/°C
COUPLER					
Isolation test voltage (between emitter and detector, climate per DIN 500414, part 2, Nov. 74)	t = 1 s		V_{ISO}	5300	V_{RMS}
Storage temperature range			T_{stg}	- 55 to + 150	°C
Ambient temperature range			T_{amb}	- 55 to + 100	°C
Soldering temperature [(2)]	max. ≤ 10 s dip soldering ≥ 0.5 mm from case bottom		T_{sld}	260	°C

Notes

- 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.

(1) Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

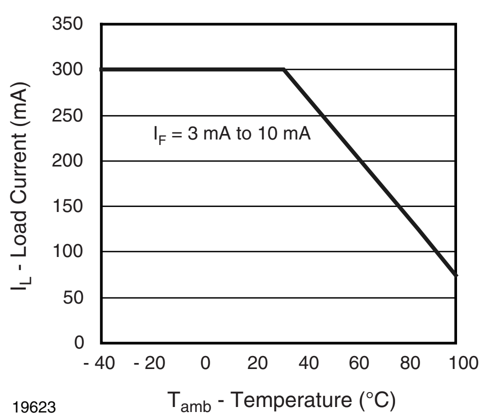
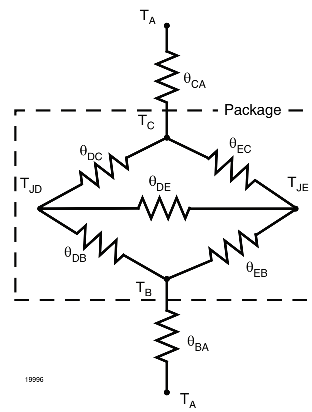


Fig. 1 - Recommended Operating Condition

THERMAL CHARACTERISTICS			
PARAMETER	**SYMBOL**	**VALUE**	**UNIT**
LED power dissipation	P_{diss}	100	mW
Output power dissipation	P_{diss}	500	mW
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	VO4254D/H/M	V_{DRM}	400			V
		VO4256D/H/M	V_{DRM}	600			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 rate 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	VO4254D	I_{FT}			1.6	mA
		VO4254H	I_{FT}			2	mA
		VO4254M	I_{FT}			3	mA
		VO4256D	I_{FT}			1.6	mA
		VO4256H	I_{FT}			2	mA
		VO4256M	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 requierements. 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	MIN.	TYP.	MAX.	UNIT
Climatic classification (according to IEC68 part 1)				55/100/21		
Pollution degree (DIN VDE 0109)				2		
Comparative tracking index per DIN IEC112/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	°C
Creepage distance			7			mm
Clearance distance			7			mm

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

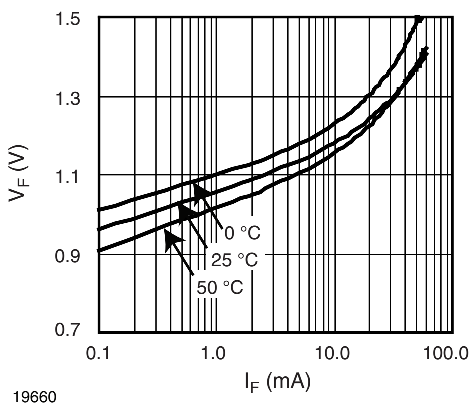


Fig. 2 - Diode Forward Voltage vs. Forward Current

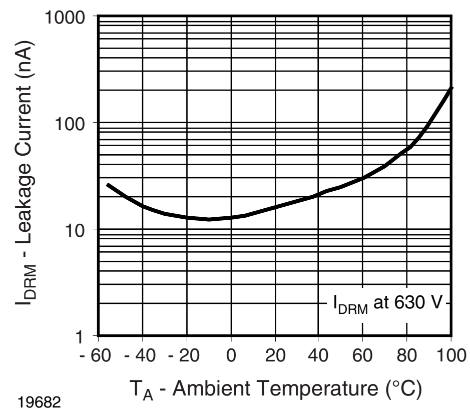


Fig. 4 - Leakage Current vs. Ambient Temperature

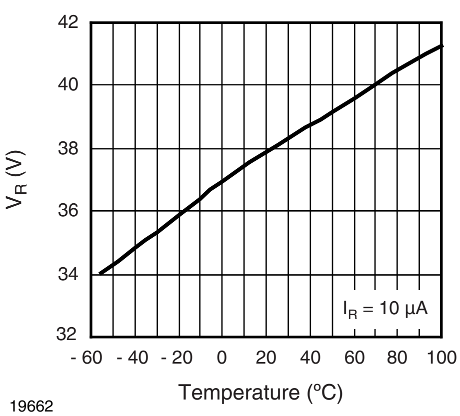


Fig. 3 - Diode Reverse Voltage vs. Temperature

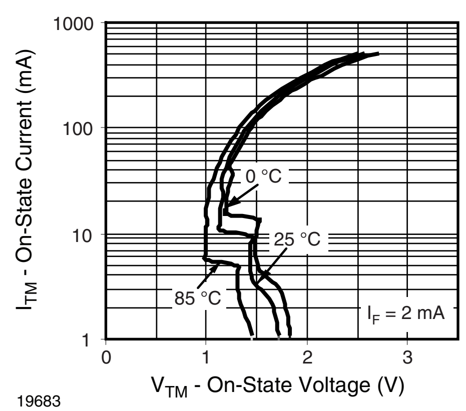


Fig. 5 - On-State Current vs. On-State Voltage

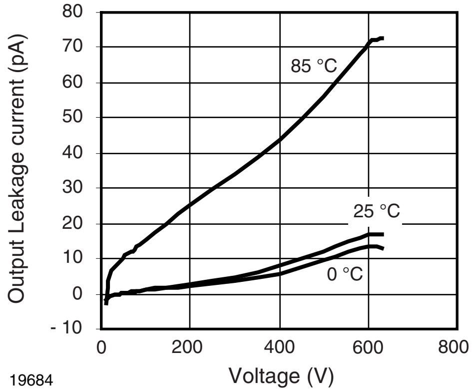


Fig. 6 - Output Off Current (Leakage) vs. Voltage

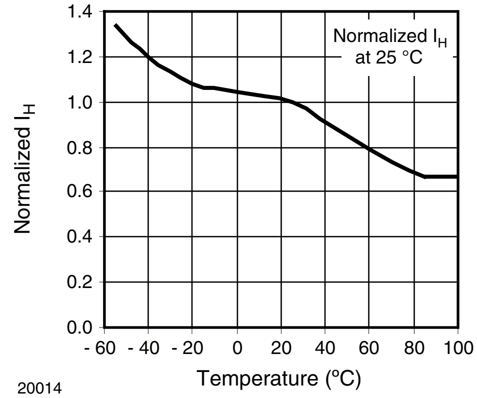


Fig. 9 - Normalized I_H vs. Temperature

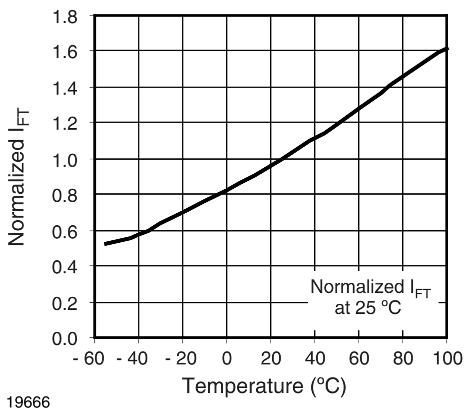


Fig. 7 - Normalized Trigger Input Current vs. Temperature

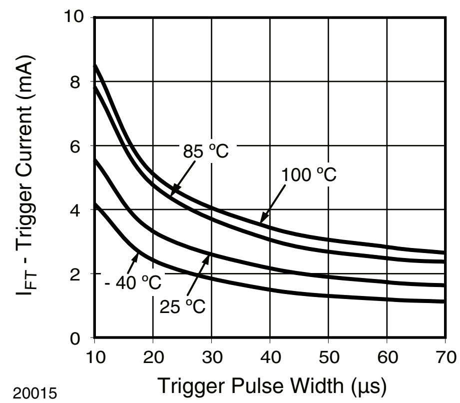


Fig. 10 - I_{FT} vs. LED Pulse Width

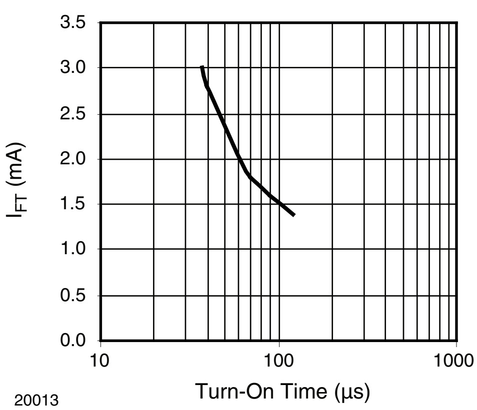
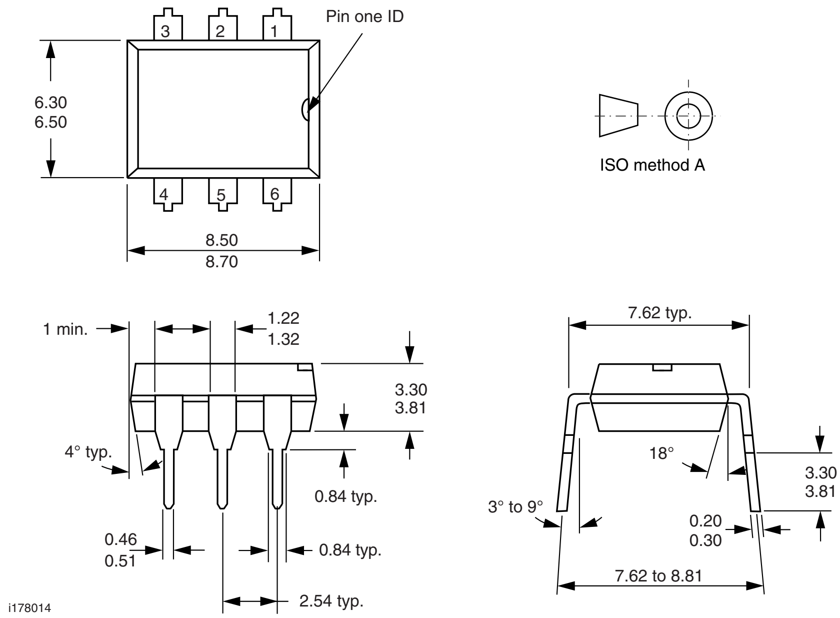
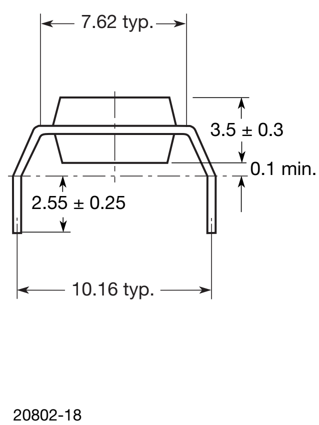


Fig. 8 - I_{FT} vs. Turn-On Time (µs)

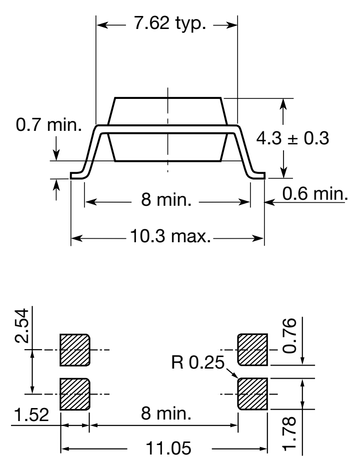
PACKAGE DIMENSIONS in millimeters



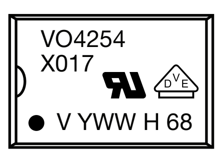
Option 6



Option 7



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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