VOT8121AM

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Optocoupler, Phototriac Output, Non-Zero Crossing, High dV/dt, Low Input Current, SOP-4 Package



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DESCRIPTION

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The VOT8121AM consists of a GaAs IRLED optically coupled to a photosensitive TRIAC packaged in a board space saving tiny flat SOP-4 package.

The VOT8121AM 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

- Flat 2.0 mm SOP-4 package
- High static dV/dt 1000 V/µs
- High input sensitivity I_{FT} = 10 mA
- 100 mA on-state current
- 800 V peak off-state blocking voltage
- Isolation rated voltage 3750 V_{RMS}
- Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>

APPLICATIONS

- Power TRIAC driver in solid-state relays
- 3-phase AC equipment
- Motor control
- Industrial control
- White goods / household equipment

AGENCY APPROVALS

- <u>UL 1577</u>
- <u>cUL</u>
- DIN EN 60747-5-5 (VDE 0884-5), available with option "V"

ORDERING INFORMATION				
VOT 812	I A M - V T # VDE TAPE OPTION AND REEL			
AGENCY CERTIFIED/PACKAGE	TRIGGER CURRENT, I _{FT} (mA)			
UL, cUL	10			
SOP-4	VOT8121AM-T			
SOP-4, 180° orientation	VOT8121AM-T2			
VDE, UL, cUL	10			
SOP-4	VOT8121AM-VT			
SOP-4, 180° orientation	VOT8121AM-VT2			



RoHS

COMPLIANT



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ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °C, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT		
INPUT						
Reverse voltage		V _R	6	V		
Forward current		١ _F	50	mA		
Power dissipation		P _{diss}	70	mW		
OUTPUT						
Peak off-state voltage		V _{DRM}	800	V		
RMS on-state current		I _{T(RMS)}	100	mA		
Power dissipation		P _{diss}	300	mW		
Peak repetitive surge current	PW = 1 ms, 120 pps	I _{TSM}	1	A		
COUPLER						
Storage temperature range		T _{stg}	-55 to +150	°C		
Ambient temperature range		T _{amb}	-55 to +110	°C		
Total power dissipation		P _{diss}	330	mW		
Soldering temperature	For 10 s	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.

This phototriac should not be used to drive a load directly. It is intended to be a trigger device only



Fig. 1 - Maximum Forward Current vs. Ambient Temperature



Fig. 2 - Maximum On-State Current vs. Ambient Temperature



ELECTRICAL CHARACTERISTICS ($T_{amb} = 25 \degree C$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
Forward voltage	I _F = 20 mA	V _F	-	1.15	1.5	V
Reverse current	V _R = 6 V	I _R	-	-	10	μA
OUTPUT						
Off-state current	V _{DRM} = 800 V	I _{DRM}	-	-	0.1	μA
On-state voltage	I _T = 100 mA peak	V _{TM}	-	1.7	3	V
Holding current		Ι _Η	-	250	-	μA
Critical rate of rise of off-state voltage		dV/dt ⁽¹⁾	1000	-	-	V/µs
COUPLER						
Trigger current	$V_{TM} = 3 V$	I _{FT}	-	-	10	mA

Notes

• Minimum and maximum values were tested 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

(1) Static dV/dt

SWITCHING CHARACTERISTICS ($T_{amb} = 25 \text{ °C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Turn-on time	$\label{eq:VD} \begin{array}{l} V_D = 6 \text{ V to } 4 \text{ V}, \ R_L = 100 \ \Omega, \\ I_F = \text{rated } I_{FT} \text{ x } 1.5 \end{array}$	t _{on}	-	30	100	μs

Note

• Minimum and maximum values were tested 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

SAFETY AND INSULATION RATINGS ($T_{amb} = 25 \text{ °C}$, unless otherwise specified)					
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT	
Climatic classification	According to IEC 68 part 1		55 / 115 / 21		
Comparative tracking index	Insulation group IIIa	CTI	175		
Maximum rated withstanding isolation voltage	According to UL1577, t = 1 min	V _{ISO}	3750	V _{RMS}	
Maximum transient isolation voltage	According to DIN EN 60747-5-5	V _{IOTM}	6000	V _{peak}	
Maximum repetitive peak isolation voltage	According to DIN EN 60747-5-5	V _{IORM}	565	V _{peak}	
	$V_{IO} = 500 \text{ V}, \text{ T}_{amb} = 25 ^{\circ}\text{C}$	R _{IO}	10 ¹²	Ω	
Isolation resistance	$V_{IO} = 500 \text{ V}, \text{ T}_{amb} = 100 ^{\circ}\text{C}$	R _{IO}	10 ¹¹	Ω	
Output safety power		P _{SO}	300	mW	
Input safety current		I _{SI}	50	mA	
Input safety temperature		Τ _S	150	°C	
Creepage distance			> 5	mm	
Clearance distance			> 5	mm	
Insulation thickness		DTI	> 0.4	mm	

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



Fig. 3 - Forward Current vs. Forward Voltage



Fig. 4 - Normalized Trigger Current vs. Ambient Temperature



Fig. 5 - Trigger Current vs. Pulse Width



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



Fig. 7 - Normalized Holding Current vs. Ambient Temperature



Fig. 8 - Off-State Leakage Current vs. Ambient Temperature

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Fig. 9 - Turn-On Time vs. Forward Current



Fig. 10 - Turn-On Time vs. Ambient Temperature



Ambient Temperature



PACKAGE DIMENSIONS (in millimeters)

SOP-4



PACKAGE MARKING



Fig. 12 - Example of VOT8121AM-VT

Notes

- "YWW" is the date code marking (Y = year code, WW = week code)
- "X" is only marked on VDE option parts
- Tape and reel suffix (T) is not part of the package marking





PACKAGING INFORMATION (in millimeters)

Tape SOP-4



Fig. 13 - Tape and Reel Packaging (3000 pieces on reel)

Tape SOP-4, 180° Orientation



Fig. 14 - Tape and Reel Packaging (3000 pieces on reel)



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Fig. 15 - Tape and Reel Shipping Medium



SOLDER PROFILES

IR Reflow Soldering (JEDEC® J-STD-020C compliant)

One time soldering reflow is recommended within the condition of temperature and time profile shown below. Do not solder more than three times.

PROFILE ITEM	CONDITIONS
Preheat	
- Temperature minimum (T _{S min.})	150 °C
- Temperature maximum (T _{S max.})	200 °C
- Time (min. to max.) (t _S)	90 s ± 30 s
Soldering zone	
- Temperature (T _L)	217 °C
- Time (t _L)	60 s
Peak temperature (T _p)	260 °C
Ramp-up rate	3 °C/s max.
Ramp-down rate	3 °C/s to 6 °C/s



Wave Soldering (JEDEC JESD22-A111 compliant)

One time soldering is recommended within the condition of temperature.

Temperature: 260 °C + 0 °C / - 5 °C Time: 10 s

Preheat temperature: 25 °C to 140 °C Preheat time: 30 s to 80 s



Hand Soldering by Soldering Iron

Allow single lead soldering in every single process. One time soldering is recommended.

Temperature: 380 °C + 0 °C / - 5 °C Time: 3 s max.

HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2 Floor life: unlimited Conditions: $T_{amb} < 30$ °C, RH < 85 % Moisture sensitivity level 1, according to J-STD-020

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