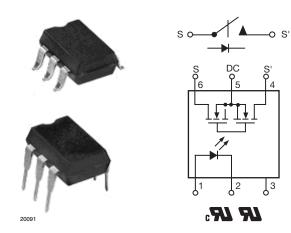


Vishay Semiconductors

1 Form A Solid State Relay



DESCRIPTION

The VO14642AT are high speed SPST normally open (1 form A) solid-state relay in a DIP-6 package. The relays are constructed as a multi-chip hybrid device. Actuation control is via an infrared LED. The output switch is a combination of a photodiode array with MOSFET switches. The relays can be configured for AC/DC or DC only operation.

FEATURES

- High speed SSR $t_{on}/t_{off} < 800 \ \mu s$
- Maximum R_{ON} 0.25 Ω
- Isolation test voltage 5300 V_{RMS}
- Load voltage 60 V
- Load current 2 A DC configuration
- DIP-6 package
- Clean bounce free switching
- TTL/CMOS compatible input
- Available on tape and reel
- Pure tin leads
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

APPLICATIONS

- Instrumentation
- Industrial controls
- Security

AGENCY APPROVALS

UL1577: file no. E52744 system code H, double

protection

cUL - UL1577: file no. E52744 system code H, double

protection

Notes

- IEC 60747-5-2 (VDE 0884) capable, consult sales representative for details
- Agency approvals are valid only for ambient temperature range - 40 °C to 85 °C

ORDERING INFORMATION			
V O 1 4 6 4 2 A PART NUMBER ELECTIVARIATION			
PACKAGE	UL, cUL		
SMD-6, tape and reel	VO14642AABTR		
DIP-6, Tubes	VO14642AT		

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ABSOLUTE MAXIMUM RATINGS (1) (T _{amb} = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT			
INPUT							
LED continous forward current		I _F	50	mA			
LED reverse voltage		V_R	5	V			
LED power dissipation	at 25 °C	P _{diss}	80	mW			
OUTPUT							
DC or peak AC load voltage		V_{L}	60	V			
Load current (DC only)		ال	2	Α			
Peak load current (AC/DC)	t = 10 ms	I _{LPK}	3.6	Α			
Output power dissipation	at 25 °C	P _{diss}	250	mW			
SSR							
Total power dissipation		P _{diss}	330	mW			
Ambient temperature range		T _{amb}	- 55 to + 85	°C			
Storage temperature range		T _{stg}	- 55 to + 125	°C			
Soldering temperature (2)	t ≤ 10 s max.	T _{sld}	260	°C			
Isolation test voltage	for 1 s	V _{ISO}	5300	V _{RMS}			

Notes

ABSOLUTE MAXIMUM RATING CURVE

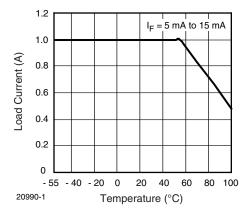


Fig. 1 - Load Current (AC/DC) vs. Temperature

⁽¹⁾ 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.

⁽²⁾ Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).



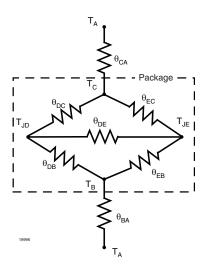
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THERMAL CHARACTERISTICS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Maximum LED junction temperature	at 25 °C	T _{jmax.}	125	°C
Maximum output die junction temperature	at 25 °C	T _{jmax.}	125	°C
Thermal resistance, junction emitter to board	at 25 °C	θ_{EB}	176	°C/W
Thermal resistance, junction emitter to case	at 25 °C	$\theta_{\sf EC}$	208	°C/W
Thermal resistance, junction detector to board	at 25 °C	θ_{DB}	67	°C/W
Thermal resistance, junction detector to case	at 25 °C	θ_{DC}	134	°C/W
Thermal resistance, junction emitter to junction detector	at 25 °C	θ_{ED}	310	°C/W
Thermal resistance, case to ambient	at 25 °C	$\theta_{\sf CA}$	2180	°C/W

Note

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 SYMBO		MIN.	TYP.	MAX.	UNIT		
INPUT								
LED forward current, switch turn-on	$I_L = 1 \text{ A, } V_L \le 0.5 \text{ V, } t = 10 \text{ ms}$	I _{Fon}		0.5	2	mA		
LED forward current, switch turn-off	$V_L = 60 \text{ V}, I_L < 1 \mu\text{A}$	I _{Foff}	50			μA		
LED reverse current	V _R = 5 V	I _R			10	μA		
LED forward voltage	I _F = 10 mA	V_{F}	1	1.3	1.5	V		
OUTPUT								
On-resistance (AC/DC)	$I_F = 10 \text{ mA}, I_L = 1 \text{ A}$	R _{ON}		0.18	0.25	Ω		
On-resistance (DC only)	I _F = 10 mA, I _L = 2 A	R _{ON}		0.05	0.07	Ω		
Off-state leakage current	$I_F = 0 \text{ mA}, V_L = 60 \text{ V}$	I _{LEAK}			1	μΑ		

Note

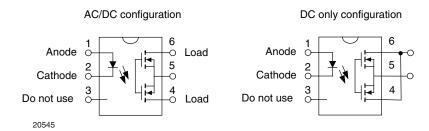
Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering
evaluations. Typical values are for information only and are not part of the testing requirements.

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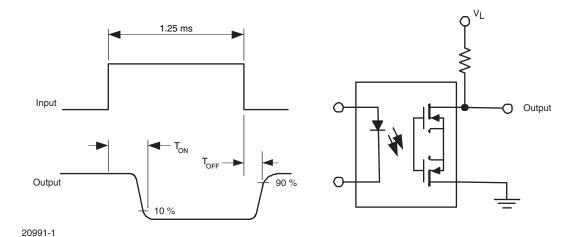
1 Form A Solid State Relay



PIN CONFIGURATION



SWITCHING CHARACTERISTICS (AC/DC CONNECTION)							
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT	
Turn-on time	I _F = 10 mA, V _L = 30 V, I _L = 200 mA	t _{on}		370	800	μs	
Turn-off time	$I_F = 10 \text{ mA}, V_L = 30 \text{ V}, I_L = 200 \text{ mA}$	t _{off}		50	800	μs	
Turn-on time	I _F = 10 mA, V _L = 5 V, I _L = 1 A	t _{on}		550		μs	
Turn-off time	I _F = 10 mA, V _L = 5 V, I _L = 1 A	t _{off}		18		μs	





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PARAMETER		TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Climatic classification		IEC 68 part 1			40/85/21		
Pollution degree		DIN VDE 0109			2		
Tracking resistance (comparative t	racking index)	Insulation group IIIa	CTI	175			
Highest allowable overvoltage		Transient overvoltage	V_{IOTM}	8000			V _{peak}
Maximum working insulation voltage	ge	Recurring peak voltage	V _{IORM}	890			V _{peak}
Insulation resistance at 25 °C		V _{IO} = 500 V	R _{IS}			≥ 10 ¹²	Ω
Insulation resistance at T _S		V _{IO} = 500 V	R _{IS}			≥ 10 ⁹	Ω
Insulation resistance at 100 °C		V _{IO} = 500 V	R _{IS}			≥ 10 ¹¹	Ω
Partial discharge test voltage		Method b, $V_{pd} = V_{IORM} \times 1.875$	V_{pd}			1669	V _{peak}
Isolation test voltage		1 s	V_{ISO}			5300	V _{RMS}
Safety limiting values -	Case temperature		T _{SI}		165		°C
maximum values allowed in the	Input current		I _{SI}		150		mA
event of a failure	Output power		P _{SO}		400		mW
Minimum external air gap (clearance distance)		Measured from input terminals to output terminals, shortest distance through air			≥ 7		mm
Minimum external tracking (creepage distance)		Measured from input terminals to output terminals, shortest distance path along body			≥ 7		mm

Note

This SSR 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)

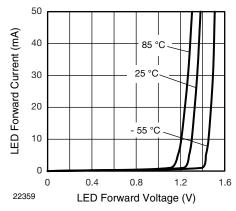


Fig. 2 - LED Forward Voltage vs. Current

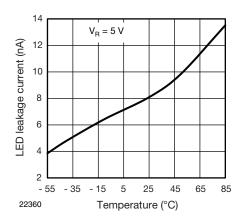


Fig. 3 - LED Leakage Current vs. Temperature



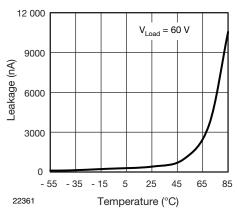


Fig. 4 - Output Leakage Current vs. Temperature

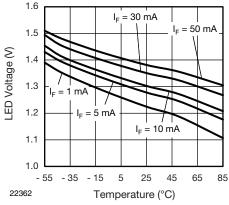


Fig. 5 - LED Voltage vs. Temperature

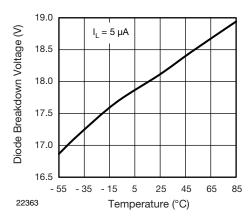


Fig. 6 - Diode Breakdown Voltage vs. Temperatur

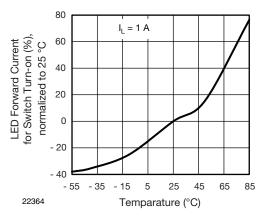


Fig. 7 - LED Current for Switch Turn-on vs. Temperature

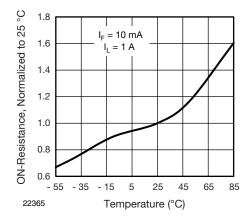


Fig. 8 - On-resistance vs. Temperature

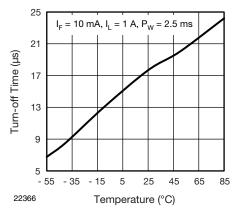


Fig. 9 - Turn-off Time vs. Temperature

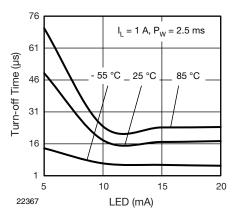


Fig. 10 - Turn-off Time vs. LED

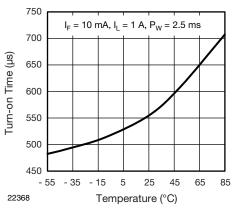


Fig. 11 - Turn-on Time vs. Temperature

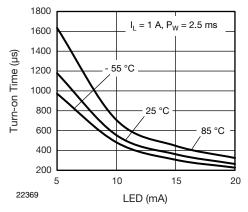


Fig. 12 - Turn-on Time vs. LED

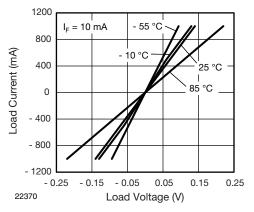


Fig. 13 - Load Current vs. Load Voltage

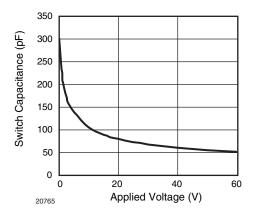


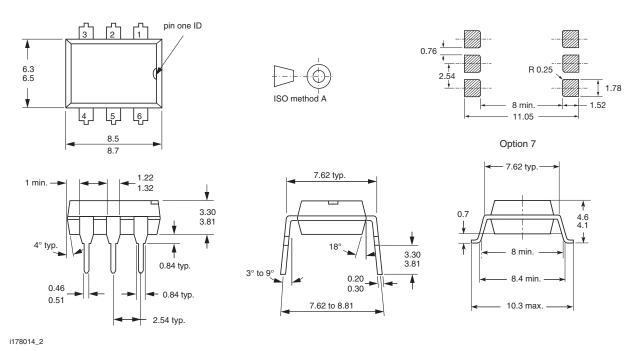
Fig. 14 - Switch Capacitance vs. Applied Voltage

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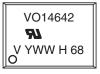
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PACKAGE DIMENSIONS in millimeters



PACKAGE MARKING



Note

Tape and reel suffix (TR) is not part of the package marking.



Legal Disclaimer Notice

Vishay

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