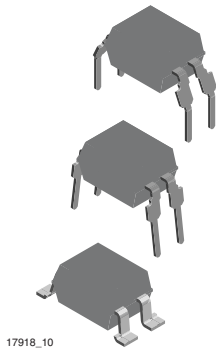
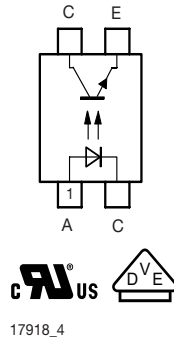


# Optocoupler, Phototransistor Output, High Temperature, 110 °C, Rated



17918\_10



17918\_4

## DESCRIPTION

The VO615A consists of a phototransistor optically coupled to a gallium arsenide infrared-emitting diode in a 4 pin plastic dual inline package.

## AGENCY APPROVALS

- BSI: EN 60065:2002, EN 60950:2000 pending
- DIN EN 60747-5-5 (VDE 0884)
- FIMKO
- UL file no. E52744
- cUL tested to CSA 22.2 bulletin 5A

## FEATURES

- CTR offered in 9 groups
- Isolation materials according to UL94-VO
- Pollution degree 2 (DIN/VDE 0110/resp. 60664)
- Climatic classification 55/110/21 (IEC 60068 part 1)
- Temperature range - 55 °C to + 110 °C
- Rated impulse voltage (transient overvoltage)  $V_{IOTM} = 6 \text{ kV}_{\text{peak}}$
- Isolation test voltage (partial discharge test voltage)  $V_{pd} = 1.6 \text{ kV}$
- Rated isolation voltage (RMS includes DC)  $V_{IOWM} = 600 V_{\text{RMS}}$
- Rated recurring peak voltage (repetitive)  $V_{IORM} = 850 V_{\text{peak}}$
- Creepage current resistance according to VDE 0303/ IEC 60112 comparative tracking index: CTI  $\geq 175$
- Compliant to RoHS directive 2002/95/EC


**RoHS**  
COMPLIANT

## APPLICATIONS

Circuits for safe protective separation against electrical shock according to safety class II (reinforced isolation):

- for appl. class I - IV at mains voltage  $\leq 300 \text{ V}$
- for appl. class I - IV at mains voltage  $\leq 600 \text{ V}$  according to table 1 of IEC 60664-1, suitable for:
  - Switch-mode power supplies
  - Line receiver
  - Computer peripheral interface
  - Microprocessor system interface

ORDER INFORMATION (1)	
PART	REMARKS
VO615A	CTR 50 % to 600 %, DIP-4
VO615A-1	CTR 40 % to 80 %, DIP-4
VO615A-2	CTR 63 % to 125 %, DIP-4
VO615A-3	CTR 100 % to 200 %, DIP-4
VO615A-4	CTR 160 % to 320 %, DIP-4
VO615A-5	CTR 50 % to 150 %, DIP-4
VO615A-6	CTR 100 % to 300 %, DIP-4
VO615A-7	CTR 80 % to 160 %, DIP-4
VO615A-8	CTR 130 % to 260 %, DIP-4
VO615A-9	CTR 200 % to 400 %, DIP-4
VO615A-X006	CTR 50 % to 600 %, DIP-4, 400 mil (option 6)
VO615A-1X006	CTR 40 % to 80 %, DIP-4, 400 mil (option 6)
VO615A-2X006	CTR 63 % to 125 %, DIP-4, 400 mil (option 6)
VO615A-3X006	CTR 100 % to 200 %, DIP-4, 400 mil (option 6)
VO615A-4X006	CTR 160 % to 320 %, DIP-4, 400 mil (option 6)
VO615A-5X006	CTR 50 % to 150 %, DIP-4, 400 mil (option 6)

ORDER INFORMATION <sup>(1)</sup>	
PART	REMARKS
VO615A-6X006	CTR 100 % to 300 %, DIP-4, 400 mil (option 6)
VO615A-7X006	CTR 80 % to 160 %, DIP-4, 400 mil (option 6)
VO615A-8X006	CTR 130 % to 260 %, DIP-4, 400 mil (option 6)
VO615A-9X006	CTR 200 % to 400 %, DIP-4, 400 mil (option 6)
VO615A-X007	CTR 50 % to 600 %, SMD-4 (option 7)
VO615A-1X007	CTR 40 % to 80 %, SMD-4 (option 7)
VO615A-2X007	CTR 63 % to 125 %, SMD-4 (option 7)
VO615A-3X007	CTR 100 % to 200 %, SMD-4 (option 7)
VO615A-4X007	CTR 160 % to 320 %, SMD-4 (option 7)
VO615A-5X007	CTR 50 % to 150 %, SMD-4 (option 7)
VO615A-6X007	CTR 100 % to 300 %, SMD-4 (option 7)
VO615A-7X007	CTR 80 % to 160 %, SMD-4 (option 7)
VO615A-8X007	CTR 130 % to 260 %, SMD-4 (option 7)
VO615A-9X007	CTR 200 % to 400 %, SMD-4 (option 7)
VO615A-X009	CTR 50 % to 600 %, SMD-4 (option 9)
VO615A-1X009	CTR 40 % to 80 %, SMD-4 (option 9)
VO615A-2X009	CTR 63 % to 125 %, SMD-4 (option 9)
VO615A-3X009	CTR 100 % to 200 %, SMD-4 (option 9)
VO615A-4X009	CTR 160 % to 320 %, SMD-4 (option 9)

**Note**

<sup>(1)</sup> For additional information on the possible lead bend and VDE options refer to option information.

ABSOLUTE MAXIMUM RATINGS <sup>(1)</sup>				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		$V_R$	6	V
Forward current		$I_F$	60	mA
Forward surge current	$t_p \leq 10 \mu\text{s}$	$I_{FSM}$	1.5	A
LED power dissipation	at 25 °C	$P_{diss}$	70	mW
<b>OUTPUT</b>				
Collector emitter voltage		$V_{CEO}$	70	V
Emitter collector voltage		$V_{ECO}$	7	V
Collector current		$I_C$	50	mA
Collector peak current	$t_p/T = 0.5, t_p \leq 10 \text{ ms}$	$I_{CM}$	100	mA
Output power dissipation	at 25 °C	$P_{diss}$	70	mW
<b>COUPLER</b>				
Isolation test voltage (RMS)	$t = 1 \text{ min}$	$V_{ISO}$	5000	$V_{RMS}$
Operating ambient temperature range		$T_{amb}$	- 55 to + 110	°C
Storage temperature range		$T_{stg}$	- 55 to + 125	°C
Soldering temperature <sup>(2)</sup>	2 mm from case, $\leq 10 \text{ s}$	$T_{sld}$	260	°C

**Notes**

<sup>(1)</sup>  $T_{amb} = 25 \text{ °C}$ , unless otherwise specified.

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.

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



Optocoupler, Phototransistor Output, Vishay Semiconductors  
High Temperature, 110 °C, Rated

<b>ELECTRICAL CHARACTERISTICS (1)</b>						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Forward voltage	$I_F = \pm 50 \text{ mA}$	$V_F$		1.25	1.6	V
Junction capacitance	$V_R = 0, f = 1 \text{ MHz}$	$C_j$		50		pF
<b>OUTPUT</b>						
Collector emitter voltage	$I_C = 1 \text{ mA}$	$V_{CE0}$	70			V
Emitter collector voltage	$I_E = 100 \mu\text{A}$	$V_{ECO}$	7			V
Collector emitter cut-off current	$V_{CE} = 20 \text{ V}, I_F = 0, E = 0$	$I_{CEO}$		10	100	nA
<b>COUPLER</b>						
Collector emitter saturation voltage	$I_F = 10 \text{ mA}, I_C = 1 \text{ mA}$	$V_{CEsat}$			0.3	V
Cut-off frequency	$V_{CE} = 5 \text{ V}, I_F = 10 \text{ mA}, R_L = 100 \Omega$	$f_c$		110		kHz
Coupling capacitance	$f = 1 \text{ MHz}$	$C_k$		0.6		pF

**Note**

(1)  $T_{amb} = 25 \text{ }^\circ\text{C}$ , unless otherwise specified.

Minimum and maximum values are testing 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.

<b>CURRENT TRANSFER RATIO</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
$I_C/I_F$	$V_{CE} = 5 \text{ V}, I_F = 1 \text{ mA}$	VO615A-1	CTR	13	30		%
		VO615A-2	CTR	22	45		%
		VO615A-3	CTR	34	70		%
		VO615A-4	CTR	56	90		%
	$V_{CE} = 5 \text{ V}, I_F = 5 \text{ mA}$	VO615A	CTR	50		600	%
		VO615A-5	CTR	50		150	%
		VO615A-6	CTR	100		300	%
		VO615A-7	CTR	80		160	%
		VO615A-8	CTR	130		260	%
	$V_{CE} = 5 \text{ V}, I_F = 10 \text{ mA}$	VO615A-9	CTR	200		400	%
		VO615A-1	CTR	40		80	%
		VO615A-2	CTR	63		125	%
		VO615A-3	CTR	100		200	%
VO615A-4	CTR	160		320	%		

<b>MAXIMUM SAFETY RATINGS (1)</b>						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Forward current		$I_F$			130	mA
<b>OUTPUT</b>						
Power dissipation		$P_{diss}$			265	mW
<b>COUPLER</b>						
Safety temperature		$T_{si}$			150	$^\circ\text{C}$

**Note**

(1) According to DIN EN 60747-5-5 (VDE 0884) (see figure 2). This optocoupler is suitable for safe electrical isolation only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits.

INSULATION RATED PARAMETERS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Partial discharge test voltage - routine test	100 %, $t_{test} = 1$ s	$V_{pd}$	1.6			kV
Partial discharge test voltage - lot test (sample test)	$t_{Tr} = 60$ s, $t_{test} = 10$ s, (see figure 2)	$V_{pd}$	1.3			kV
Insulation resistance	$V_{IO} = 500$ V	$R_{IO}$	$10^{12}$			$\Omega$
	$V_{IO} = 500$ V, $T_{amb} = 100$ °C	$R_{IO}$	$10^{11}$			$\Omega$
	$V_{IO} = 500$ V, $T_{amb} = 150$ °C (construction test only)	$R_{IO}$	$10^9$			$\Omega$
Rated impulse voltage		$V_{IOTM}$			6	kV
Max. working voltages	Recurring peak voltage	$V_{IORM}$	850			$V_{peak}$

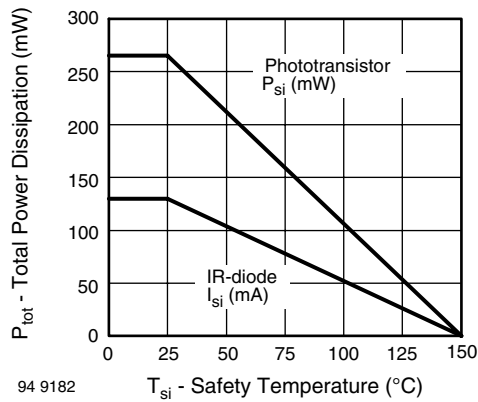


Fig. 1 - Derating Diagram

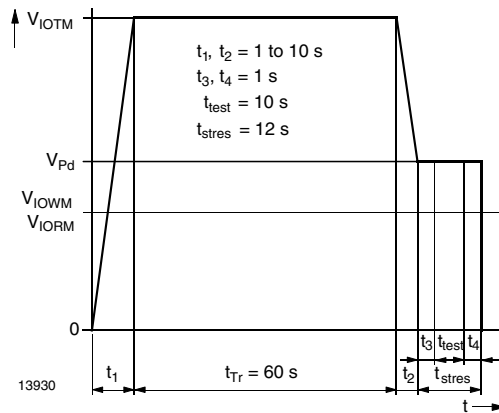
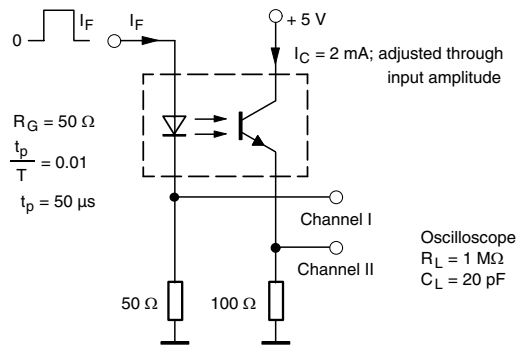


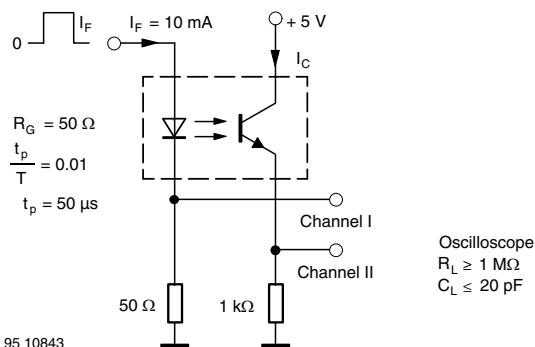
Fig. 2 - Test Pulse Diagram for Sample Test According to DIN EN 60747-5-5 (VDE 0884)/DIN EN 60747-; IEC 60747

SWITCHING CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN	TYP.	MAX	UNIT
Delay time	$V_S = 5$ V, $I_C = 2$ mA, $R_L = 100$ $\Omega$ , (see figure 3)	$t_d$		3		$\mu$ s
Rise time	$V_S = 5$ V, $I_C = 2$ mA, $R_L = 100$ $\Omega$ , (see figure 3)	$t_r$		3		$\mu$ s
Fall time	$V_S = 5$ V, $I_C = 2$ mA, $R_L = 100$ $\Omega$ , (see figure 3)	$t_f$		4.7		$\mu$ s
Storage time	$V_S = 5$ V, $I_C = 2$ mA, $R_L = 100$ $\Omega$ , (see figure 3)	$t_s$		0.3		$\mu$ s
Turn-on time	$V_S = 5$ V, $I_C = 2$ mA, $R_L = 100$ $\Omega$ , (see figure 3)	$t_{on}$		6		$\mu$ s
Turn-off time	$V_S = 5$ V, $I_C = 2$ mA, $R_L = 100$ $\Omega$ , (see figure 3)	$t_{off}$		5		$\mu$ s
Turn-on time	$V_S = 5$ V, $I_F = 10$ mA, $R_L = 1$ k $\Omega$ , (see figure 4)	$t_{on}$		9		$\mu$ s
Turn-off time	$V_S = 5$ V, $I_F = 10$ mA, $R_L = 1$ k $\Omega$ , (see figure 4)	$t_{off}$		10		$\mu$ s

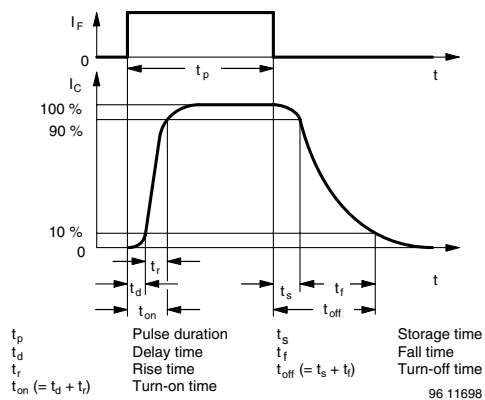
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**Fig. 3 - Test Circuit, Non-Saturated Operation**


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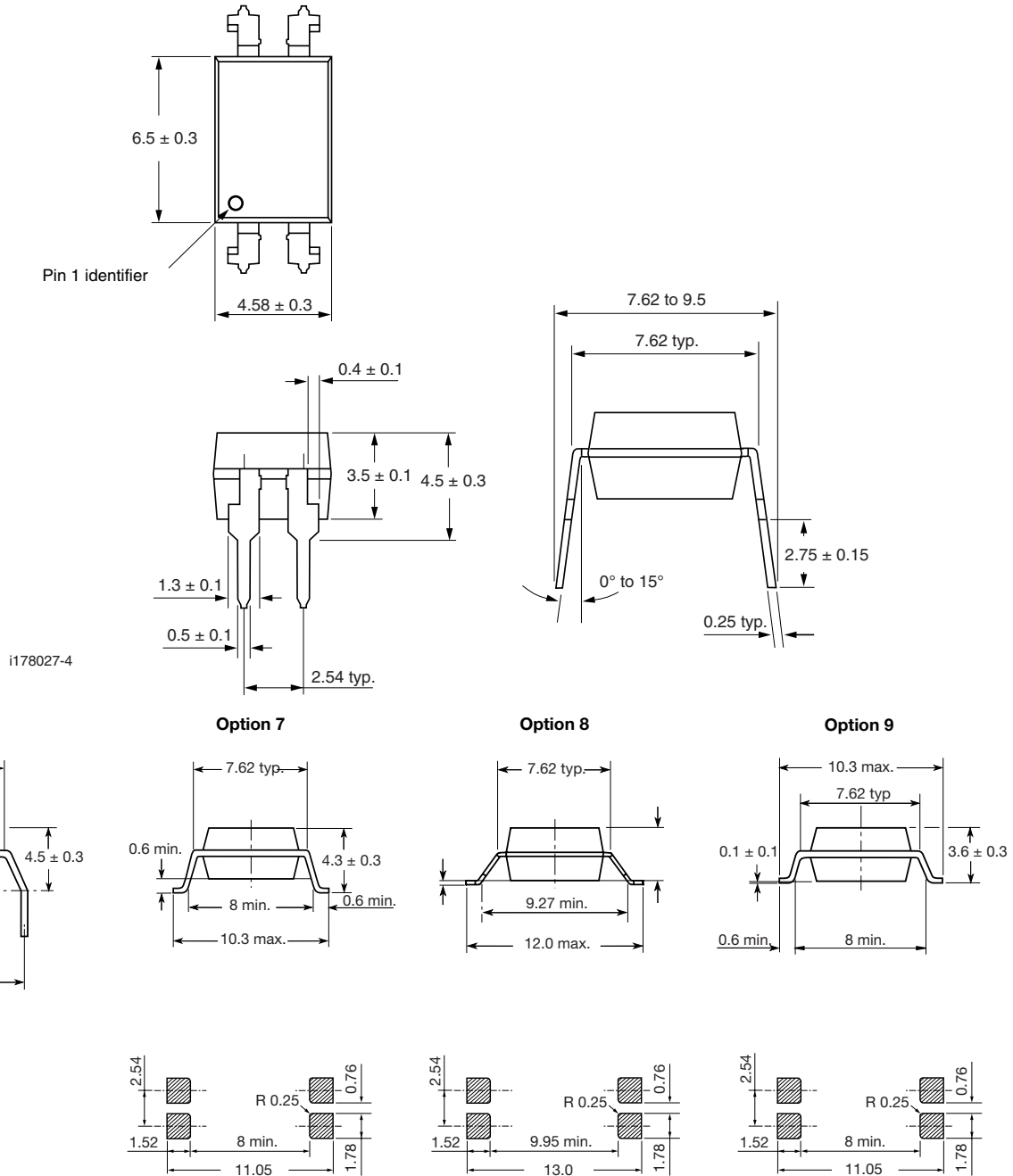
**Fig. 4 - Test Circuit, Saturated Operation**

**Fig. 5 - Switching Times**

# VO615A

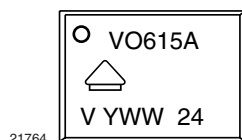


Vishay Semiconductors Optocoupler, Phototransistor Output,  
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## PACKAGE DIMENSIONS in millimeters



## PACKAGE MARKING



### Note

VDE logo is only printed on option 1 parts. Option information is not marked on the part.



## Disclaimer

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