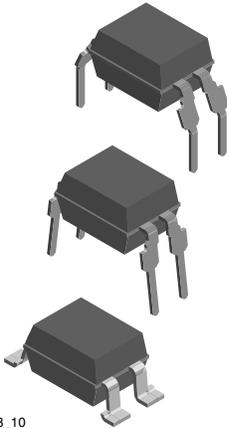
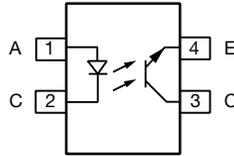


# Optocoupler, Low Input Current, Phototransistor Output



17918\_10



## FEATURES

- 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)  $V_{IOWM} = 600 \text{ V}_{\text{RMS}}$
- Rated recurring peak voltage (repetitive)  $V_{IORM} = 850 \text{ V}_{\text{peak}}$
- Thickness through insulation  $\geq 0.4 \text{ mm}$
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**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

## DESCRIPTION

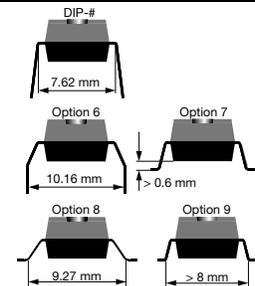
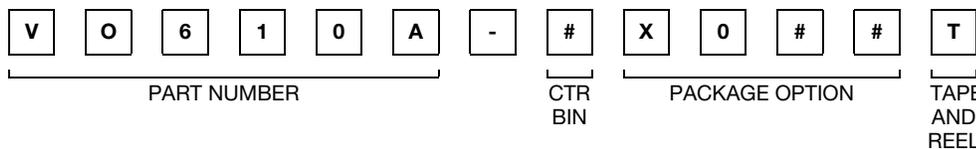
The VO610A consists of a phototransistor optically coupled to a gallium arsenide infrared-emitting diode in a 4 pin plastic dual inline package.

## AGENCY APPROVALS

(All parts are certified under base model VO610A)

- BSI: EN 60065:2002, EN 60950:2000
- DIN EN 60747-5-5, available with option 1
- FIMKO EN 60065, EN 60335-1, EN 60950-1
- UL file no. E52744
- cUL tested to CSA 22.2 bulletin 5A
- CQC GB4943.1-2011, GB8898-2011

## ORDERING INFORMATION



AGENCY CERTIFIED/PACKAGE	CTR (%)			
	40 to 80	63 to 125	100 to 200	160 to 320
<b>BSI, FIMKO, UL, cUL</b>				
DIP-4	VO610A-1	VO610A-2	VO610A-3	-
SMD-4, option 7	-	-	VO610A-3X007T	-
SMD-4, option 8	-	-	VO610A-3X008T	VO610A-4X008T
SMD-4, option 9	-	-	VO610A-3X009T	-
<b>VDE, BSI, FIMKO, UL, cUL</b>				
DIP-4	-	-	VO610A-3X001	-
DIP-4, 400 mil, option 6	-	-	VO610A-3X016	-
SMD-4, option 7	-	-	-	VO610A-4X017T
SMD-4, option 8	-	-	VO610A-3X018T	-
SMD-4, option 9	VO610A-1X019T	-	VO610A-3X019T	VO610A-4X019T

### Note

- Additional options may be possible, please contact sales office



<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		$V_R$	6	V
Forward current		$I_F$	60	mA
Forward surge current	$t_p \leq 10\text{ }\mu\text{s}$	$I_{FSM}$	1.5	A
LED power dissipation	at $25\text{ }^{\circ}\text{C}$	$P_{diss}$	100	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 $25\text{ }^{\circ}\text{C}$	$P_{diss}$	150	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	$^{\circ}\text{C}$
Storage temperature range		$T_{stg}$	- 55 to + 125	$^{\circ}\text{C}$
Soldering temperature <sup>(1)</sup>	2 mm from case, $\leq 10\text{ s}$	$T_{sld}$	260	$^{\circ}\text{C}$

**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.
- <sup>(1)</sup> Refer to reflow profile for soldering conditions for surface mounted parts (SMD), and wave profile for soldering conditions for through hole parts (DIP), please go to "Assembly Instructions" ([www.vishay.com/doc?80054](http://www.vishay.com/doc?80054)).

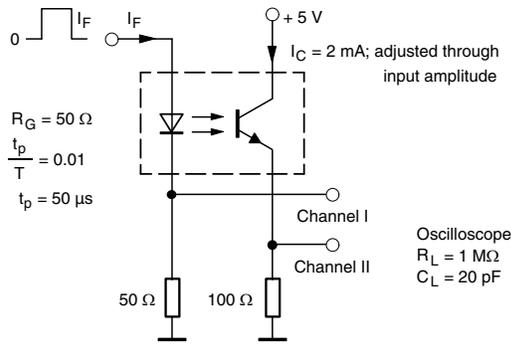
<b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Forward voltage	$I_F = 50\text{ mA}$	$V_F$		1.25	1.6	V
Reverse current	$V_R = 6\text{ V}$	$I_R$			100	$\mu\text{A}$
Junction capacitance	$V_R = 0, f = 1\text{ MHz}$	$C_j$		50		pF
<b>OUTPUT</b>						
Collector emitter voltage	$I_C = 1\text{ mA}$	$V_{CEO}$	70			V
Emitter collector voltage	$I_E = 100\text{ }\mu\text{A}$	$V_{ECO}$	7			V
Collector emitter cut-off current	$V_{CE} = 20\text{ V}, I_F = 0\text{ A}$	$I_{CEO}$		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	$V_{CE} = 5\text{ V}, I_F = 10\text{ mA}, R_L = 100\text{ }\Omega$	$f_c$		110		kHz
Coupling capacitance	$f = 1\text{ MHz}$	$C_k$		0.6		pF

**Note**

- 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.

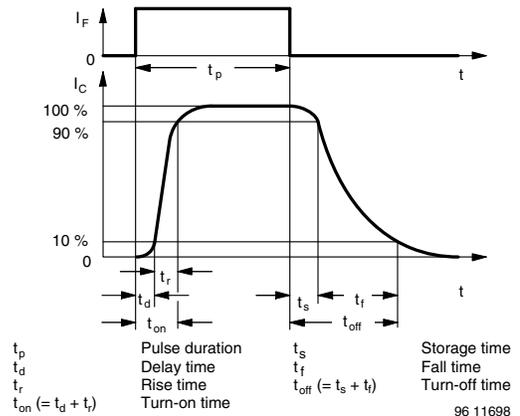


<b>SWITCHING CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Delay time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\ \Omega$ , (see figure 3)	$t_d$		3		$\mu\text{s}$
Rise time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\ \Omega$ , (see figure 3)	$t_r$		3		$\mu\text{s}$
Fall time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\ \Omega$ , (see figure 3)	$t_f$		4.7		$\mu\text{s}$
Storage time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\ \Omega$ , (see figure 3)	$t_s$		0.3		$\mu\text{s}$
Turn-on time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\ \Omega$ , (see figure 3)	$t_{on}$		6		$\mu\text{s}$
Turn-off time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\ \Omega$ , (see figure 3)	$t_{off}$		5		$\mu\text{s}$
Turn-on time	$V_S = 5\text{ V}$ , $I_F = 10\text{ mA}$ , $R_L = 1\text{ k}\Omega$ , (see figure 4)	$t_{on}$		9		$\mu\text{s}$
Turn-off time	$V_S = 5\text{ V}$ , $I_F = 10\text{ mA}$ , $R_L = 1\text{ k}\Omega$ , (see figure 4)	$t_{off}$		10		$\mu\text{s}$



95 10804

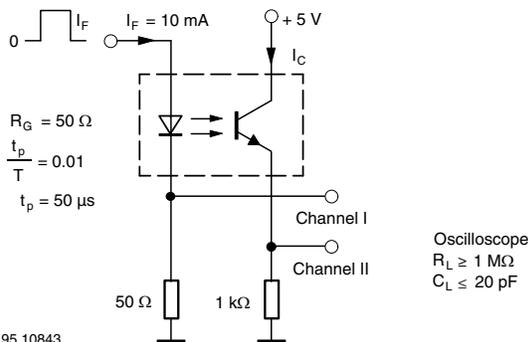
Fig. 3 - Test Circuit, Non-Saturated Operation



$t_p$  Pulse duration  
 $t_d$  Delay time  
 $t_r$  Rise time  
 $t_{on} (= t_d + t_r)$  Turn-on time  
 $t_s$  Storage time  
 $t_f$  Fall time  
 $t_{off} (= t_s + t_f)$  Turn-off time

96 11698

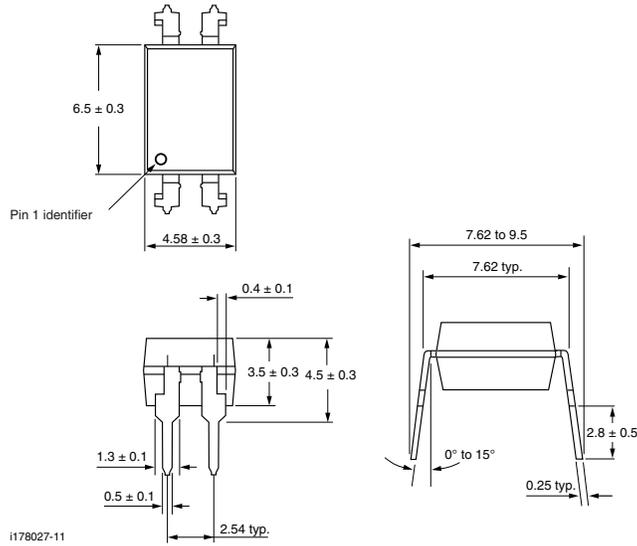
Fig. 5 - Switching Times



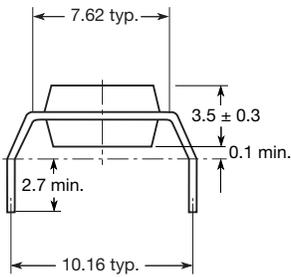
95 10843

Fig. 4 - Test Circuit, Saturated Operation

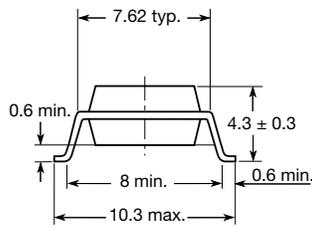
**PACKAGE DIMENSIONS** in millimeters



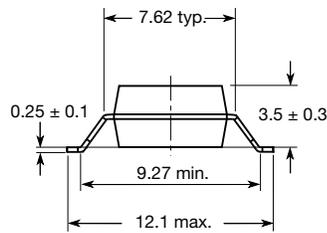
**Option 6**



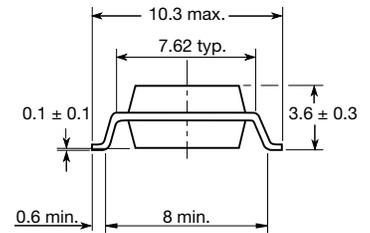
**Option 7**



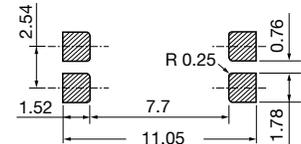
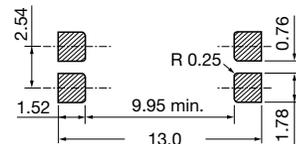
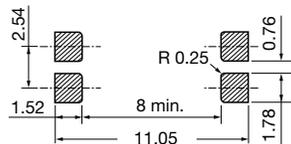
**Option 8**



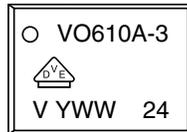
**Option 9**



20802-38



**PACKAGE MARKING** (Example of VO617A-3X018T)



**Note**

- Only options 1, 7, and 8 are reflected in the package marking.
- The VDE logo is only printed on option 1 parts.
- Tape and reel suffix (T) is not part of the package marking.

**PACKING INFORMATION**

DEVICE PER TUBE			
TYPE	UNITS/TUBE	TUBES/BOX	UNITS/BOX
DIP-4, standard and option 6	100	40	4000

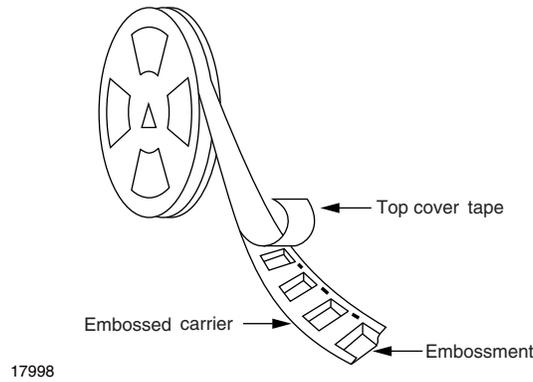


Fig. 6 - Tape and Reel Shipping Medium

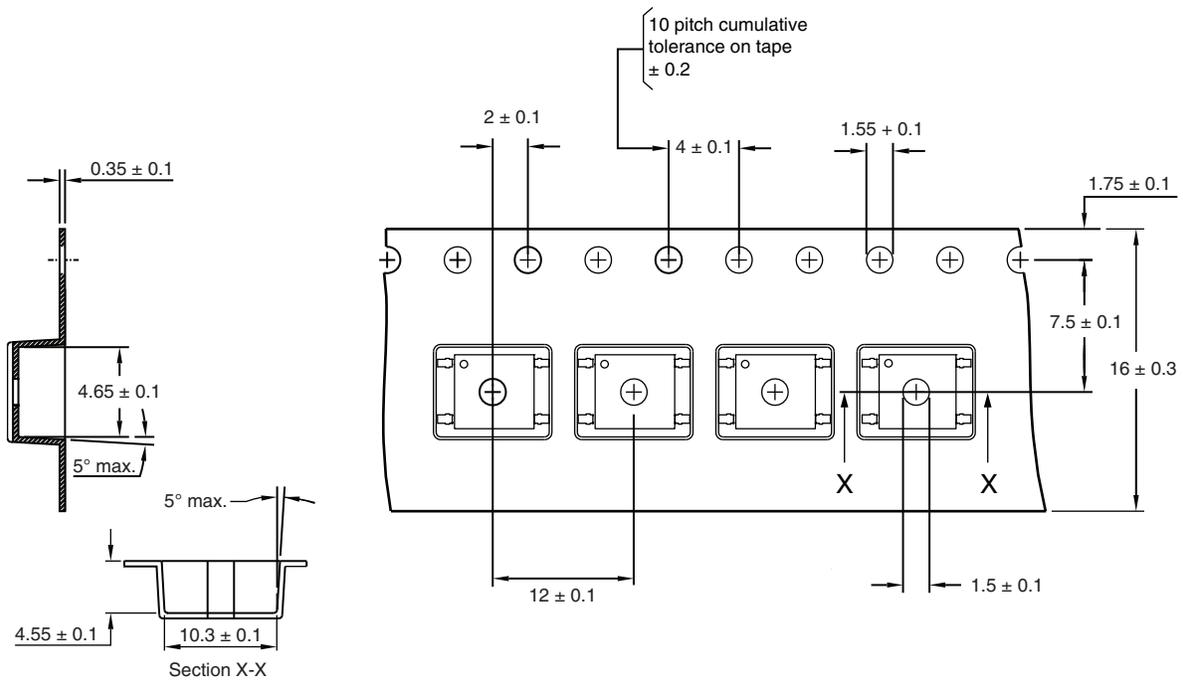


Fig. 7 - Tape and Reel Packing for Option 7 and Option 9 (1000 units per reel)

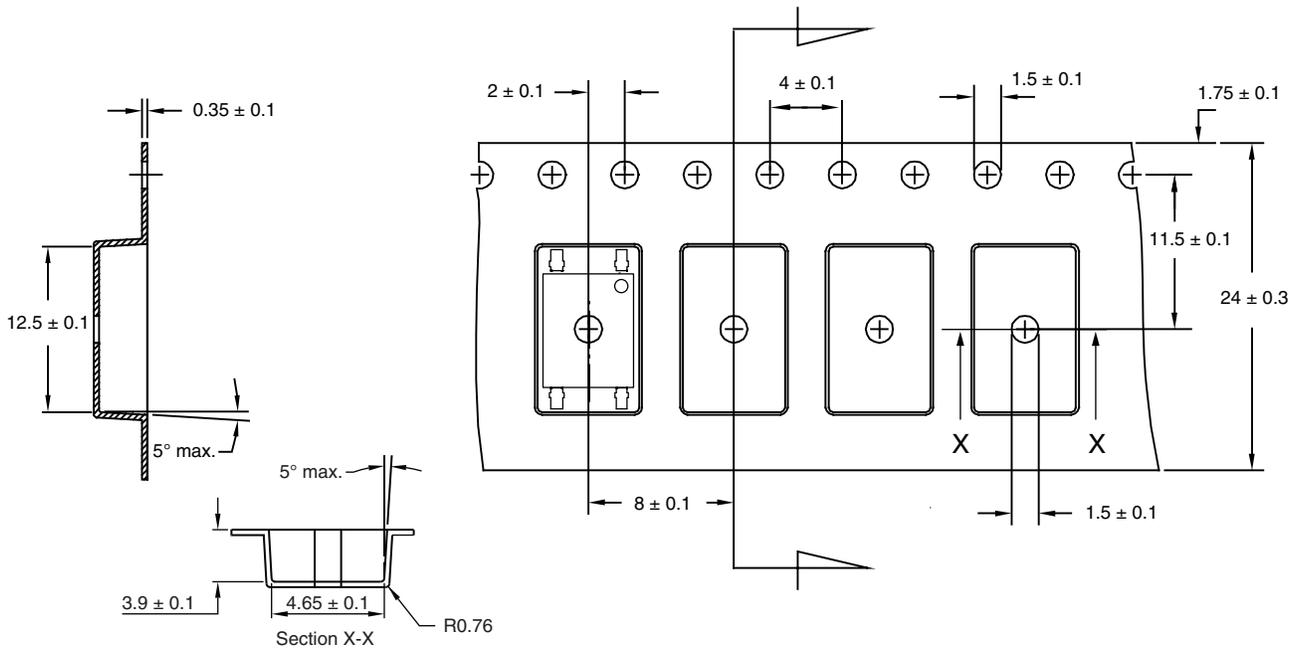


Fig. 8 - Tape and Reel Packing for Option 8  
(2000 units per reel)



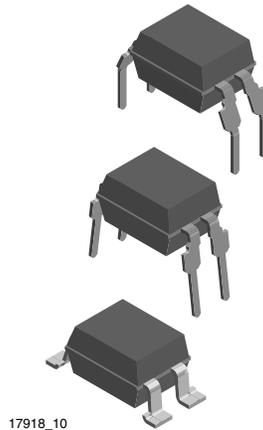
## Footprint and Schematic Information for VO610A

The footprint and schematic symbols for the following parts can be accessed using the associated links. They are available in Eagle, Altium, KiCad, OrCAD / Allegro, Pulsonix, and PADS.

Note that the 3D models for these parts can be found on the Vishay product page.

PART NUMBER	FOOTPRINT / SCHEMATIC
VO610A-1	<a href="http://www.snapeda.com/parts/VO610A-1/Vishay/view-part">www.snapeda.com/parts/VO610A-1/Vishay/view-part</a>
VO610A-1X019T	<a href="http://www.snapeda.com/parts/VO610A-1X019T/Vishay/view-part">www.snapeda.com/parts/VO610A-1X019T/Vishay/view-part</a>
VO610A-2	<a href="http://www.snapeda.com/parts/VO610A-2/Vishay/view-part">www.snapeda.com/parts/VO610A-2/Vishay/view-part</a>
VO610A-3	<a href="http://www.snapeda.com/parts/VO610A-3/Vishay/view-part">www.snapeda.com/parts/VO610A-3/Vishay/view-part</a>
VO610A-3X001	<a href="http://www.snapeda.com/parts/VO610A-3X001/Vishay/view-part">www.snapeda.com/parts/VO610A-3X001/Vishay/view-part</a>
VO610A-3X007T	<a href="http://www.snapeda.com/parts/VO610A-3X007T/Vishay/view-part">www.snapeda.com/parts/VO610A-3X007T/Vishay/view-part</a>
VO610A-3X009T	<a href="http://www.snapeda.com/parts/VO610A-3X009T/Vishay/view-part">www.snapeda.com/parts/VO610A-3X009T/Vishay/view-part</a>
VO610A-3X016	<a href="http://www.snapeda.com/parts/VO610A-3X016/Vishay/view-part">www.snapeda.com/parts/VO610A-3X016/Vishay/view-part</a>
VO610A-3X019T	<a href="http://www.snapeda.com/parts/VO610A-3X019T/Vishay/view-part">www.snapeda.com/parts/VO610A-3X019T/Vishay/view-part</a>
VO610A-4X017T	<a href="http://www.snapeda.com/parts/VO610A-4X017T/Vishay/view-part">www.snapeda.com/parts/VO610A-4X017T/Vishay/view-part</a>
VO610A-4X019T	<a href="http://www.snapeda.com/parts/VO610A-4X019T/Vishay/view-part">www.snapeda.com/parts/VO610A-4X019T/Vishay/view-part</a>

For technical issues and product support, please contact [optocoupleranswers@vishay.com](mailto:optocoupleranswers@vishay.com).





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