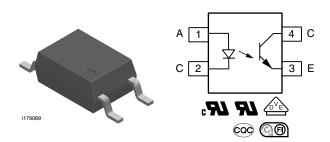
**GREEN** 



## Vishay Semiconductors

# Low Input Current, Phototransistor Output, SOP-4, Mini-Flat Package



#### **DESCRIPTION**

The 110 °C rated VOM618A has a GaAs infrared emitting diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a 4 pin 100 mil lead pitch miniflat package. It features a high current transfer ratio with low input current, low coupling capacitance, and high isolation voltage.

These coupling devices are designed for signal transmission between two electrically separated circuits.

#### **FEATURES**

- Operating temperature from 55 °C to + 110 °C
- SOP-4 mini-flat package
- CTR range 40 % to 600 %, I<sub>F</sub> = 1 mA
- Isolation test voltage, 3750 V<sub>RMS</sub>
- · Low saturation voltage
- · Fast switching times
- Low coupling capacitance
- End-stackable, 0.100" (2.54 mm) spacing
- Material categorization: For definitions of compliance please see <a href="https://www.vishay.com/doc?99912"><u>www.vishay.com/doc?99912</u></a>

# APPLICATIONS

- PLCs
- Telecommunication
- Lighting control system
- Solar inverters
- AC drives

#### **AGENCY APPROVALS**

(All parts are certified under base model VOM618A)

- UL1577, file no. E52744
- cUL tested to CSA 22.2 bulletin 5A
- DIN EN 60747-5-5 (VDE 0884-5), available with option 1
- FIMKO EN 60065 and EN 60950-1
- CQC: GB8898-2011, GB4943.1-2011

ORDERING INFORMATION										
V O M 6 1 8 A - # X O  PART NUMBER CTR BIN VDE						0 0 VDE OPTIO	Д	T APE .ND EEL	SOP-4	
AGENCY CERTIFIED/		CTR (%)								
PACKAGE		1 mA								
UL, cUL, FIMKO, CQC	50 to 600	40 to 80	63 to 125	100 to 200	160 to 320	50 to 100	250 to 500	80 to 160	130 to 260	200 to 400
SOP-4, mini-flat	VOM618AT	VOM618A-1T	VOM618A-2T	VOM618A-3T	VOM618A-4T	VOM618A-5T	VOM618A-6T	VOM618A-7T	VOM618A-8T	VOM618A-9T
VDE, UL, cUL, CQC, FIMKO	50 to 600	40 to 80	63 to 125	100 to 200	160 to 320	50 to 100	250 to 500	80 to 160	130 to 260	200 to 400
SOP-4, mini-flat	VOM618A- X001T	VOM618A- 1X001T	VOM618A- 2X001T	VOM618A- 3X001T	VOM618A- 4X001T	VOM618A- 5X001T	VOM618A- 6X001T	VOM618A- 7X001T	VOM618A- 8X001T	VOM618A- 9X001T



## www.vishay.com

## Vishay Semiconductors

<b>ABSOLUTE MAXIMUM RATINGS</b> (T <sub>amb</sub> = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT			
INPUT			•				
DC forward current		l <sub>F</sub>	60	mA			
Reverse voltage		V <sub>R</sub>	6	V			
Power dissipation		P <sub>diss</sub>	70	mW			
Surge forward current	t <sub>p</sub> ≤ 10 μs	I <sub>FSM</sub>	2.5	Α			
OUTPUT							
Collector emitter voltage		V <sub>CEO</sub>	80	V			
Emitter collector voltage		V <sub>ECO</sub>	7	V			
Collector current		I <sub>C</sub>	50	mA			
Collector current	$t_p \le 1 \text{ ms}$	I <sub>C</sub>	100	mA			
Power dissipation		P <sub>diss</sub>	150	mW			
COUPLER			•				
Isolation test voltage between emitter and detector	t = 1 min	V <sub>ISO</sub>	3750	V <sub>RMS</sub>			
Total power dissipation		P <sub>tot</sub>	170	mW			
Operating temperature range		T <sub>amb</sub>	- 55 to + 110	°C			
Storage temperature range		T <sub>stg</sub>	- 55 to + 150	°C			
Junction temperature		T <sub>j</sub>	125	°C			
Soldering temperature (1)		T <sub>sld</sub>	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) See "Assembly Instructions" for surface mounted devices (www.vishay.com/doc?80054).

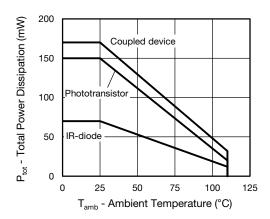


Fig. 1 - Total Power Dissipation vs. Ambient Temperature



<b>ELECTRICAL CHARACTERISTICS</b> (T <sub>amb</sub> = 25 °C, unless otherwise specified)								
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT		
INPUT								
Forward voltage	I <sub>F</sub> = 5 mA	$V_{F}$		1.1	1.6	V		
Reverse current	V <sub>R</sub> = 6 V	I <sub>R</sub>		0.01	10	μΑ		
Capacitance	$V_R = 0 V$ , $f = 1 MHz$	Cj		9		pF		
OUTPUT	OUTPUT							
Collector emitter leakage current	V <sub>CE</sub> = 20 V	I <sub>CEO</sub>		0.4	100	nA		
Collector emitter breakdown voltage	I <sub>C</sub> = 100 μA	BV <sub>CEO</sub>	80			V		
Emitter collector breakdown voltage	I <sub>E</sub> = 10 μA	BV <sub>ECO</sub>	7			V		
Collector emitter capacitance	V <sub>CE</sub> = 5 V, f = 1 MHz	C <sub>CE</sub>		2.8		pF		
COUPLER								
Coupling capacitance	f = 1 MHz	C <sub>C</sub>		0.3		pF		
Collector emitter saturation voltage	$I_F = 1 \text{ mA}, I_C = 0.25 \text{ mA}$	V <sub>CEsat</sub>		0.12	0.4	V		
Cut-off frequency	$I_F$ = 10 mA, $V_{CC}$ = 5 V, $R_L$ = 100 $\Omega$	f <sub>ctr</sub>		110		kHz		

#### 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.

CURRENT TRANSFER RATIO (T <sub>amb</sub> = 25 °C, unless otherwise specified)									
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT		
		VOM618A	CTR	50		600	%		
	I <sub>F</sub> = 1 mA, V <sub>CE</sub> = 5 V	VOM618A-1	CTR	40		80	%		
		VOM618A-2	CTR	63		125	%		
I <sub>C</sub> /I <sub>F</sub>		VOM618A-3	CTR	100		200	%		
		VOM618A-4	CTR	160		320	%		
		VOM618A-5	CTR	50		100	%		
		VOM618A-6	CTR	250		500	%		
		VOM618A-7	CTR	80		160	%		
		VOM618A-8	CTR	130		260	%		
		VOM618A-9	CTR	200		400	%		

<b>SWITCHING CHARACTERISTICS</b> (T <sub>amb</sub> = 25 °C, unless otherwise specified)									
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT			
NON-SATURATED									
Rise and fall time	$I_C$ = 2 mA, $V_{CC}$ = 5 V, $R_L$ = 100 $\Omega$	t <sub>r</sub>		5		μs			
Fall time		t <sub>f</sub>		4		μs			
Turn-on time		t <sub>on</sub>		7		μs			
Turn-off time		t <sub>off</sub>		6		μs			
SATURATED	SATURATED								
Rise and fall time		t <sub>r</sub>		6		μs			
Fall time	$I_F = 1.6 \text{ mA}, V_{CC} = 5 \text{ V},$	t <sub>f</sub>		29		μs			
Turn-on time	$R_L = 4.7 \text{ k}\Omega$	t <sub>on</sub>		8		μs			
Turn-off time		t <sub>off</sub>		35		μs			

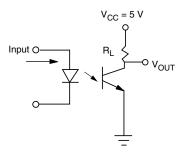


Fig. 2 - Test Circuit

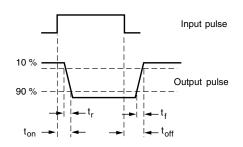


Fig. 3 - Test Circuit and Waveforms

SAFETY AND INSULATION	RATINGS			
PARAMETER		SYMBOL	VALUE	UNIT
MAXIMUM SAFETY RATINGS				
Output safety power		P <sub>SO</sub>	300	mW
Input safety current		I <sub>si</sub>	200	mW
Safety temperature		T <sub>S</sub>	150	°C
Comparative tracking index		CTI	175	
INSULATION RATED PARAMETERS	3			
Maximum withstanding isolation volta	ge	V <sub>ISO</sub>	3750	V <sub>RMS</sub>
Maximum transient isolation voltage	V <sub>IOTM</sub>	6000	V <sub>peak</sub>	
Maximum repetitive peak isolation vol	tage	V <sub>IORM</sub>	565	V <sub>peak</sub>
Insulation resistance	T <sub>amb</sub> = 25 °C, V <sub>DC</sub> = 500 V	R <sub>IO</sub>	10 <sup>12</sup>	Ω
Isolation resistance	$T_{amb} = 100  ^{\circ}C,  V_{DC} = 500  V$	R <sub>IO</sub>	10 <sup>11</sup>	Ω
Climatic classification (according to IE	EC 68 part 1)		55/110/21	
Environment (pollution degree in acco	rdance to DIN VDE 0109)		2	
Internal creepage		≥ 5	mm	
External creepage		≥ 5	mm	
Clearance			≥ 5	mm
Insulation thickness			≥ 0.4	mm

#### Note

As per DIN EN 60747-5-5 (VDE 0884), § 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<sub>amb</sub> = 25 °C, unless otherwise specified)

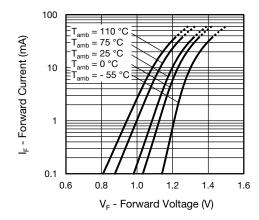


Fig. 4 - Forward Voltage vs. Forward Current

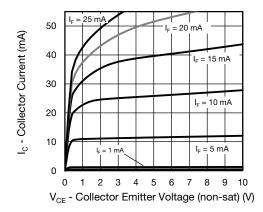


Fig. 5 - Collector Current vs. Collector Emitter Voltage (non-saturated)

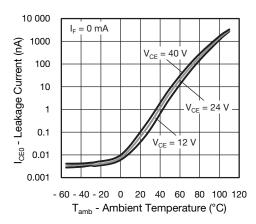


Fig. 6 - Collector Emitter Current vs. Ambient Temperature

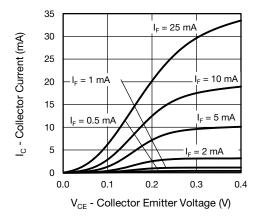


Fig. 7 - Collector Current vs. Collector Emitter Voltage (saturated)

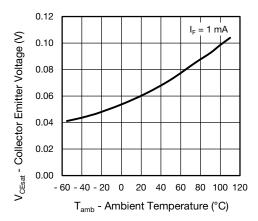


Fig. 8 - Collector Emitter Voltage vs. Ambient Temperature (saturated)

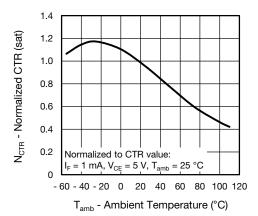


Fig. 9 - Normalized Current Transfer Ratio vs. Ambient Temperature (saturated)

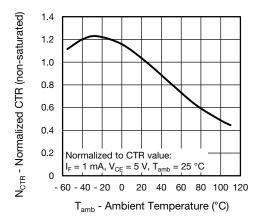


Fig. 10 - Normalized Current Transfer Ratio vs. Ambient Temperature (non-saturated)

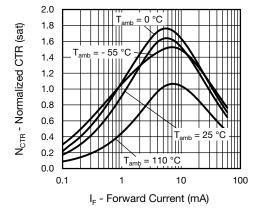
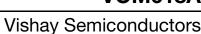


Fig. 11 - Current Transfer Ratio vs. Forward Current (saturated) normalized to 1 mA at 25 °C





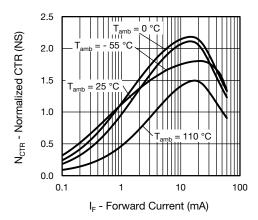


Fig. 12 - Current Transfer Ratio vs. Forward Current (non-saturated) normalized to 1 mA at 25 °C

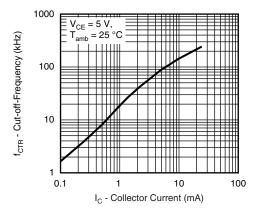


Fig. 13 - Cut-off Frequency (- 3 dB) vs. Collector Current

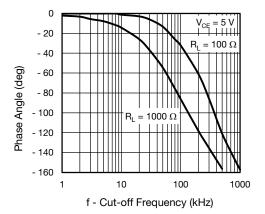


Fig. 14 - F<sub>CTR</sub> vs. Phase Angle

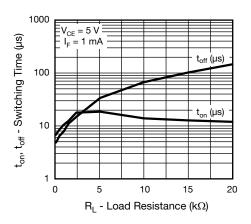


Fig. 15 - Switching Time vs. Load Resistance

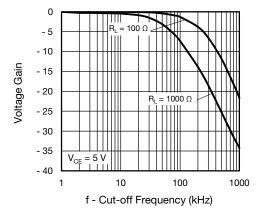
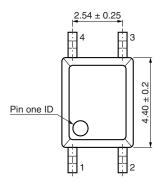
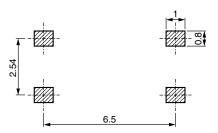
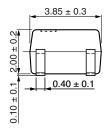


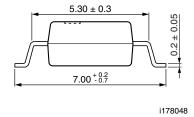
Fig. 16 - Voltage Gain vs. Cut-off Frequency

#### **PACKAGE DIMENSIONS** in millimeters









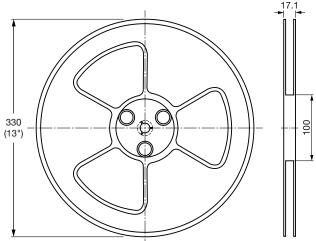
## PACKAGE MARKING (example of VOM618A-3X001T)

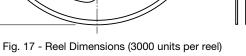


#### **Notes**

- Only option 1 is reflected in the package marking with the character "X".
- Tape and reel suffix (T) is not part of the package marking.

## TAPE AND REEL DIMENSIONS in millimeters





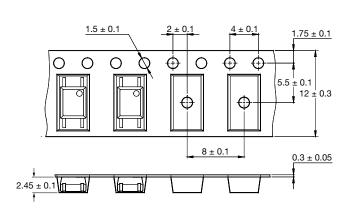


Fig. 18 - Tape Dimensions





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