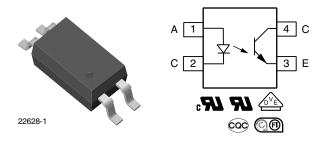


# Optocoupler, Phototransistor Output, SSOP-4, Half Pitch, Mini-Flat Package



### **DESCRIPTION**

The VOS617A series has a GaAs infrared emitting diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a 4-pin 50 mil lead pitch mini-flat package.

It features a high current transfer ratio at low input current, low coupling capacitance, and high isolation voltage.

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

#### **FEATURES**

- High CTR with low input current
- Low profile package (half pitch)
- High collector emitter voltage, V<sub>CEO</sub> = 80 V
- Isolation test voltage = 3750 V<sub>RMS</sub>
- · Low coupling capacitance
- High common mode transient immunity
- Material categorization:
   For definitions of compliance please see <a href="https://www.vishay.com/doc?99912">www.vishay.com/doc?99912</a>





COMPLIANT
HALOGEN
FREE
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(5-2008)

#### **APPLICATIONS**

- Telecom
- · Industrial controls
- · Battery powered equipment
- · Office machines
- · Programmable controllers

#### **AGENCY APPROVALS**

Safety application model number covering all products in this datasheet is VOS617A. This model number should be used when consulting safety agency documents.

- UL1577, file no. E52744
- cUL
- DIN EN 60747-5-5 (VDE 0884-5), available with option 1
- FIMKO EN 60065, EN 60950-1
- CQC GB4943.1-2011 and GB8898-2011 (suitable for installation altitude below 2000 m)

ORDERING INFORMATION								
V O S 6 1 7 A - # X 0 0 1 T  PART NUMBER CTR PACKAGE OPTION TAPE AND SOP-4								
			BIN		AND REEL		<b>→</b>	
AGENCY CERTIFIED/				CTR (%)				
PACKAGE		5 mA						
UL, cUL, FIMKO, CQC	50 to 600	63 to 125	100 to 200	160 to 320	80 to 160	130 to 260	200 to 400	
SSOP-4, 50 mil pitch	VOS617AT	VOS617A-2T	VOS617A-3T	VOS617A-4T	VOS617A-7T	VOS617A-8T	VOS617A-9T	
UL, CUL, FIMKO, CQC, VDE (option 1)	50 to 600	63 to 125	100 to 200	160 to 320	80 to 160	130 to 260	200 to 400	
SSOP-4, 50 mil pitch	VOS617A- X001T	VOS617A- 2X001T	VOS617A- 3X001T	VOS617A- 4X001T	VOS617A- 7X001T	VOS617A- 8X001T	VOS617A- 9X001T	

#### Note

Additional options may be possible, please contact sales office.



<b>ABSOLUTE MAXIMUM RATINGS</b> (T <sub>amb</sub> = 25 °C, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT		
INPUT	•					
Reverse voltage		$V_{R}$	6	V		
Power dissipation		P <sub>diss</sub>	70	mW		
Surge forward current	t <sub>p</sub> ≤ 10 μs	I <sub>FSM</sub>	1.5	Α		
Forward current		I <sub>F</sub>	50	mA		
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		
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		
Storage temperature range		T <sub>stg</sub>	-55 to +150	°C		
Ambient temperature range		T <sub>amb</sub>	-55 to +110	°C		
Junction temperature		Tj	125	°C		
Soldering temperature (1)	t = 10 s	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) Refer to reflow profile for soldering conditions for surface mounted devices.

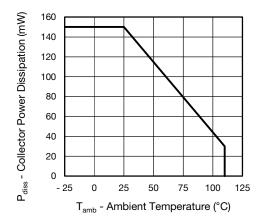


Fig. 1 - Power Dissipation vs. Ambient Temperature

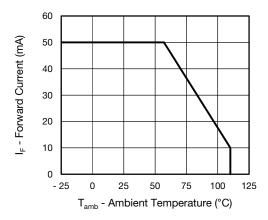


Fig. 2 - Forward Current vs. Ambient Temperature

<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> = 50 mA	$V_{F}$		1.18	1.5	V	
Reverse current	V <sub>R</sub> = 6 V	I <sub>R</sub>		0.01	10	μA	
Capacitance	$V_R = 0 V, f = 1 MHz$	Cı		7.3		pF	
OUTPUT							
Collector emitter leakage current	V <sub>CE</sub> = 10 V	I <sub>CEO</sub>		0.3	100	nA	
Collector emitter breakdown voltage	I <sub>C</sub> = 100 μA	$BV_{CEO}$	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>		5		pF	
COUPLER							
Collector emitter saturation voltage	$I_F = 5 \text{ mA}, I_C = 2.5 \text{ mA}$	V <sub>CEsat</sub>		0.25	0.4	V	
Cut-off frequency	$I_F = 10$ mA, $V_{CC} = 5$ V, $R_L = 100$ $\Omega$	f <sub>ctr</sub>		155		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
I <sub>C</sub> /I <sub>F</sub>	I <sub>F</sub> = 5 mA, V <sub>CE</sub> = 5 V	VOS617A	CTR	50		600	%
		VOS617A-2	CTR	63		125	%
		VOS617A-3	CTR	100		200	%
		VOS617A-4	CTR	160		320	%
		VOS617A-7	CTR	80		160	%
		VOS617A-8	CTR	130		260	%
		VOS617A-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	$I_{C} = 2 \text{ mA}, V_{CC} = 5 \text{ V},$ $R_{L} = 100 \Omega$	t <sub>r</sub>		3		μs		
Fall time		t <sub>f</sub>		3		μs		
Turn-on time		t <sub>on</sub>		6		μs		
Turn-off time		t <sub>off</sub>		4		μs		
SATURATED								
Rise and fall time	$I_F = 1.6$ mA, $V_{CC} = 5$ V, $R_L = 1.9$ k $\Omega$	t <sub>r</sub>		3		μs		
Fall time		t <sub>f</sub>		12		μs		
Turn-on time		t <sub>on</sub>		4		μs		
Turn-off time		t <sub>off</sub>		18		μs		

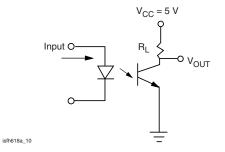


Fig. 3 - Test Circuit

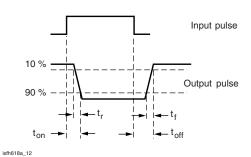


Fig. 4 - Test Circuit and Waveforms



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	mA			
Safety temperature		T <sub>S</sub>	150	°C			
Comparative tracking index		CTI	175				
INSULATION RATED PARAMETERS							
Maximum withstanding isolation voltage	Maximum withstanding isolation voltage 40 % to 60 % RH, AC test of 1 min		3750	V <sub>RMS</sub>			
Maximum transient isolation voltage	V <sub>IOTM</sub>	6000	$V_{peak}$				
Maximum repetitive peak isolation voltage		V <sub>IORM</sub>	565	V <sub>peak</sub>			
Insulation resistance	$T_{amb} = 25  ^{\circ}\text{C},  V_{DC} = 500  \text{V}$	R <sub>IO</sub>	≥ 10 <sup>12</sup>	Ω			
Isolation resistance $T_{amb} = 100  ^{\circ}\text{C},  V_{DC} = 500  \text{V}$		R <sub>IO</sub>	≥ 10 <sup>11</sup>	Ω			
Climatic classification (according to IEC 68 part		55/110/21					
Environment (pollution degree in accordance to		2					
Creepage distance		≥ 5	mm				
Clearance distance		≥ 5	mm				
Insulation thickness	DTI	≥ 0.4	mm				

#### Note

### TYPICAL CHARACTERISTICS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

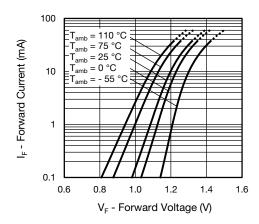


Fig. 5 - Forward Voltage vs. Forward Current

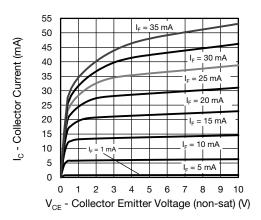


Fig. 6 - Collector Current vs. Collector Emitter Voltage

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.



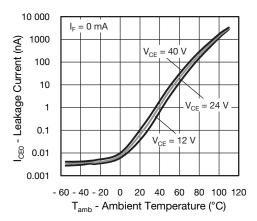


Fig. 7 - Leakage Current vs. Ambient Temperature

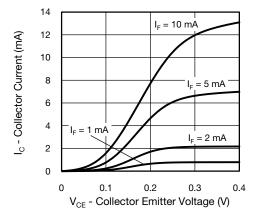


Fig. 8 - Collector Current vs. Collector Emitter Voltage

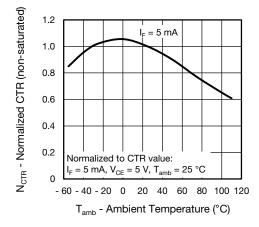


Fig. 9 - Normalized Current Transfer Ratio (non-saturated) vs.

Ambient Temperature

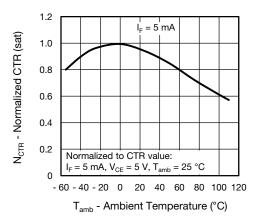


Fig. 10 - Normalized Current Transfer Ratio (saturated) vs.
Ambient Temperature

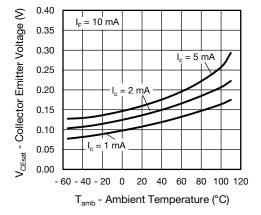


Fig. 11 - Collector Emitter Voltage vs. Ambient Temperature

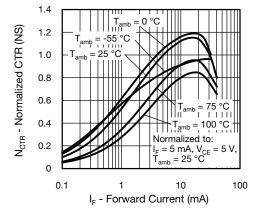
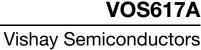


Fig. 12 - Normalized CTR (non-saturated) vs. Forward Current





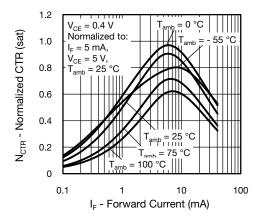


Fig. 13 - Normalized CTR (saturated) vs. Forward Current

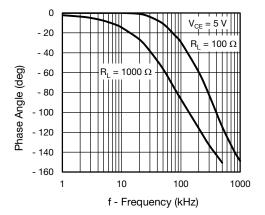


Fig. 14 - F<sub>CTR</sub> vs. Phase Angle

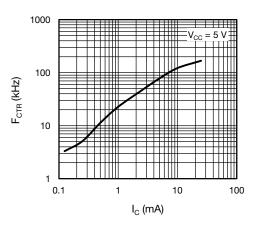


Fig. 15 - F<sub>CTR</sub> vs. Collector Current

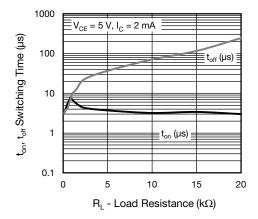
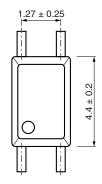


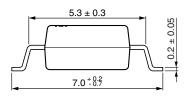
Fig. 16 - Switching Time vs. Load Resistance

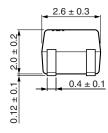


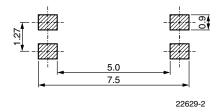


### **PACKAGE DIMENSIONS** in millimeters

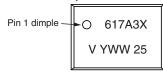








### PACKAGE MARKING (example of VOS617A-3X001T)



#### Notes

- Option 1 is reflected with letter "X".
- Tape and reel suffix (T) is not part of the package marking.

### **TAPE AND REEL DIMENSIONS** in millimeters

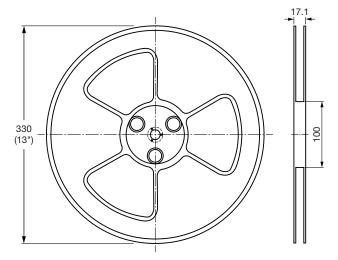


Fig. 17 - Reel Dimensions (3000 units per reel)

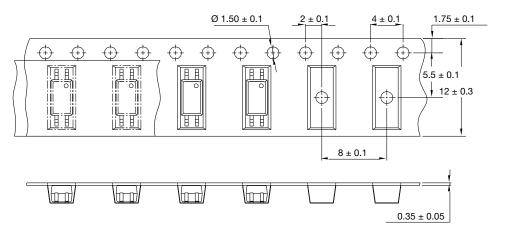


Fig. 18 - Tape Dimensions



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