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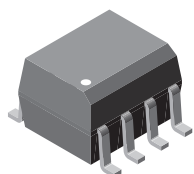


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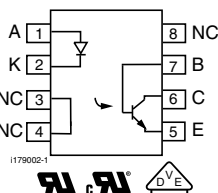
# VO205AT, VO206AT, VO207AT, VO208AT

Vishay Semiconductors

## Optocoupler, Phototransistor Output, with Base Connection in SOIC-8 Package



1179074



### FEATURES

- High  $V_{CEO}$ , 70 V
- Isolation test voltage, 4000  $V_{RMS}$
- Material categorization:  
For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



RoHS COMPLIANT

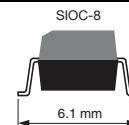
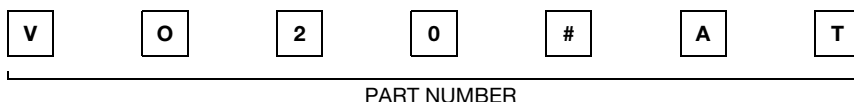
### DESCRIPTION

The VO205AT, VO206AT, VO207AT, VO208AT are optically coupled pairs with a gallium arsenide infrared LED and a silicon NPN phototransistor. Signal information, including a DC level, can be transmitted by the device while maintaining a high degree of electrical isolation between input and output. This family comes in a standard SOIC-8A small outline package for surface mounting which makes them ideally suited for high density application with limited space.

### AGENCY APPROVALS

- UL1577, file no. E52744 system code Y
- cUL - file no. E52744, equivalent to CSA bulletin 5A
- DIN EN 60747-5-5 (VDE 0884-5) approved, contact customer service if this option is required

### ORDERING INFORMATION



AGENCY CERTIFIED/PACKAGE	CTR (%)			
UL, cUL	40 to 80	63 to 125	100 to 200	160 to 320
SOIC-8	VO205AT	VO206AT	VO207AT	VO208AT

### ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Peak reverse voltage		$V_R$	6	V
Forward continuous current		$I_F$	60	mA
Peak forward current	1 $\mu\text{s}$ , 300 pps	$I_{FM}$	1	A
Power dissipation		$P_{diss}$	90	mW
Derate linearly from 25 $^{\circ}\text{C}$			1.2	mW/ $^{\circ}\text{C}$
<b>OUTPUT</b>				
Collector emitter breakdown voltage		$BV_{CEO}$	70	V
Emitter collector breakdown voltage		$BV_{ECO}$	7	V
Collector-base breakdown voltage		$BV_{CBO}$	70	V
$I_{Cmax, DC}$		$I_{Cmax, DC}$	50	mA
$I_{Cmax}$	$t < 1\text{ ms}$	$I_{Cmax}$	100	mA
Power dissipation		$P_{diss}$	150	mW
Derate linearly from 25 $^{\circ}\text{C}$			2	mW/ $^{\circ}\text{C}$
<b>COUPLER</b>				
Isolation test voltage		$V_{ISO}$	4000	$V_{RMS}$
Total package dissipation (LED and detector)		$P_{tot}$	240	mW
Derate linearly from 25 $^{\circ}\text{C}$			3.3	mW/ $^{\circ}\text{C}$
Operating temperature		$T_{amb}$	- 40 to + 100	$^{\circ}\text{C}$
Storage temperature		$T_{stg}$	- 40 to + 150	$^{\circ}\text{C}$
Soldering time	at 260 $^{\circ}\text{C}$	$T_{slid}$	10	s

### Note

- 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.



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ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>							
Forward voltage	I <sub>F</sub> = 10 mA		V <sub>F</sub>		1.3	1.5	V
Reverse current	V <sub>R</sub> = 6 V		I <sub>R</sub>		0.1	100	μA
Capacitance	V <sub>R</sub> = 0 V		C <sub>O</sub>		13		pF
<b>OUTPUT</b>							
Collector emitter breakdown voltage	I <sub>C</sub> = 100 μA		BV <sub>CEO</sub>	70			V
Emitter collector breakdown voltage	I <sub>E</sub> = 10 μA		BV <sub>ECO</sub>	7	10		V
Collector base breakdown voltage	I <sub>C</sub> = 100 μA		BV <sub>CBO</sub>	100			V
Collector base current			I <sub>CBO</sub>			1	nA
Emitter base current			I <sub>EBO</sub>			1	nA
Collector emitter leakage current	V <sub>CE</sub> = 10 V		I <sub>CEO</sub>		5	50	nA
Saturation voltage, collector emitter	I <sub>C</sub> = 2 mA, I <sub>F</sub> = 10 mA		V <sub>CEsat</sub>			0.4	V
<b>COUPLER</b>							
Capacitance, input to output			C <sub>IO</sub>		0.5		pF

**Note**

- Minimum and maximum values were tested 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.

CURRENT TRANSFER RATIO							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
I <sub>C</sub> /I <sub>F</sub>	I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 5 V	VO205AT	CTR	40		80	%
		VO206AT	CTR	63		125	%
		VO207AT	CTR	100		200	%
		VO208AT	CTR	160		320	%

SWITCHING CHARACTERISTICS							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Turn-on time	I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 Ω, V <sub>CC</sub> = 10 V		t <sub>on</sub>		3		μs
Turn-off time	I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 Ω, V <sub>CC</sub> = 10 V		t <sub>off</sub>		3		μs
Rise time	I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 Ω, V <sub>CC</sub> = 10 V		t <sub>r</sub>		3		μs
Fall time	I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 Ω, V <sub>CC</sub> = 10 V		t <sub>f</sub>		2		μs

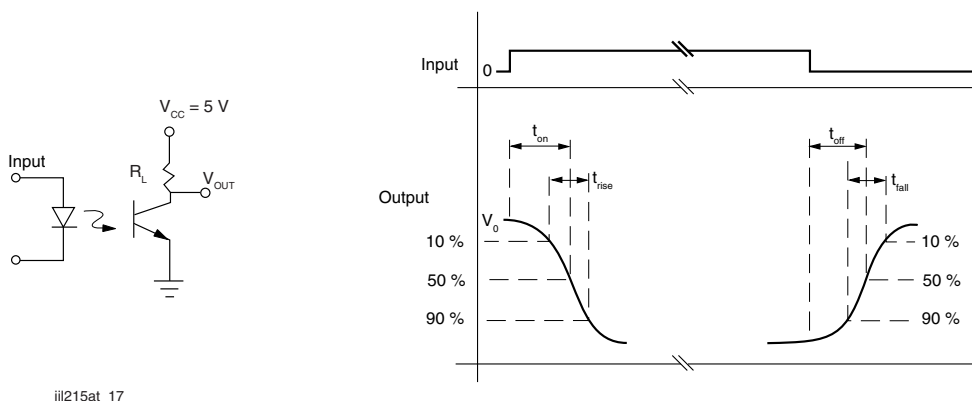


Fig. 1 Switching Test Circuit



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COMMON MODE TRANSIENT IMMUNITY						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Common mode transient immunity at logic high	$V_{CM} = 1000\text{ V}_{P-P}$ , $R_L = 1\text{ k}\Omega$ , $I_F = 0\text{ mA}$	$ C_{MH} $		5000		V/ $\mu$ s
Common mode transient immunity at logic low	$V_{CM} = 1000\text{ V}_{P-P}$ , $R_L = 1\text{ k}\Omega$ , $I_F = 10\text{ mA}$	$ C_{ML} $		5000		V/ $\mu$ s

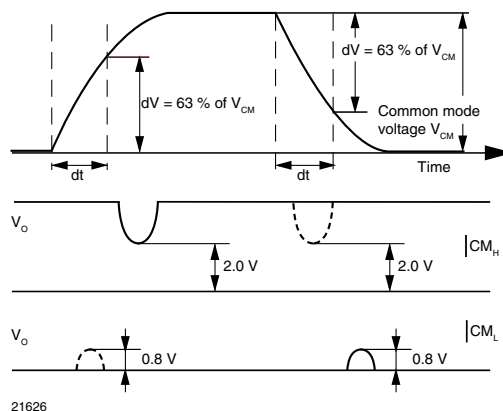
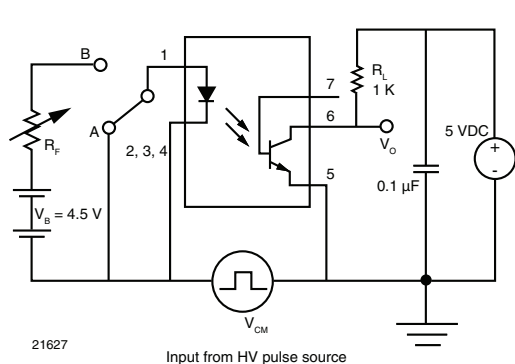


Fig. 1 - Test Circuit for Common Mode Transient Immunity

SAFETY AND INSULATION RATINGS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Climatic classification (according to IEC 68 part 1)				40/100/21		
Polution degree				2		
Comparative tracking index		CTI	175		399	
Isolation test voltage	1 s	$V_{ISO}$	4000			$V_{RMS}$
Peak transient overvoltage		$V_{IOTM}$	6000			V
Peak insulation voltage		$V_{IORM}$	560			V
Resistance (input to output)		$R_{IO}$		100		$G\Omega$
Safety rating - power output		$P_{SO}$			350	mW
Safety rating - input current		$I_{SI}$			150	mA
Safety rating - temperature		$T_{SI}$			165	$^{\circ}C$
External creepage distance			4			mm
External clearance distance			4			mm
Internal creepage distance			3.3			mm
Insulation thickness			0.2			mm

**Note**

- As per IEC 60747-5-2, §7.4.3.8.1, 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.



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**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

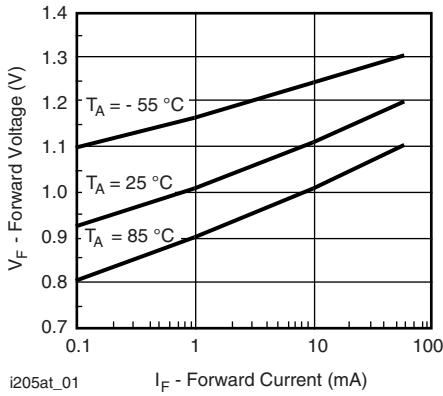


Fig. 2 - Forward Voltage vs. Forward Current

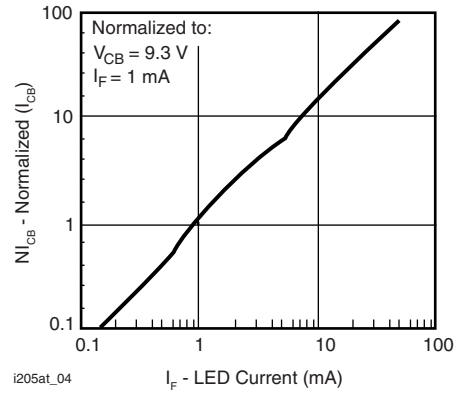


Fig. 5 - Normalized Collector-Base Photocurrent vs. LED Current

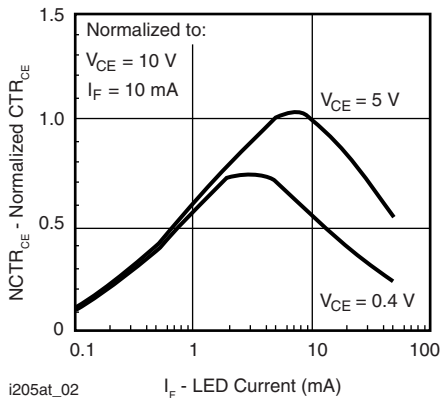


Fig. 3 - Normalized Non-Saturated and Saturated  $CTR_{CE}$  vs. LED Current

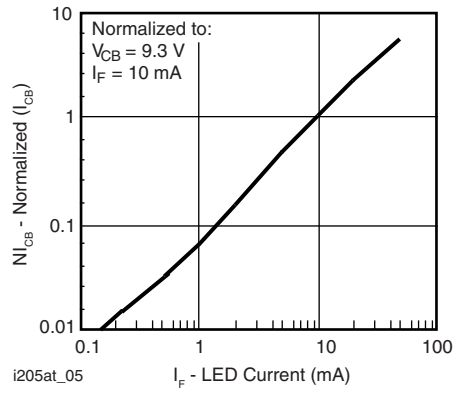


Fig. 6 - Normalized Collector-Base Photocurrent vs. LED Current

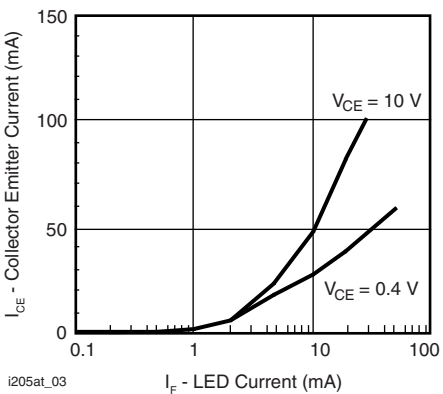


Fig. 4 - Collector Emitter Current vs. LED Current

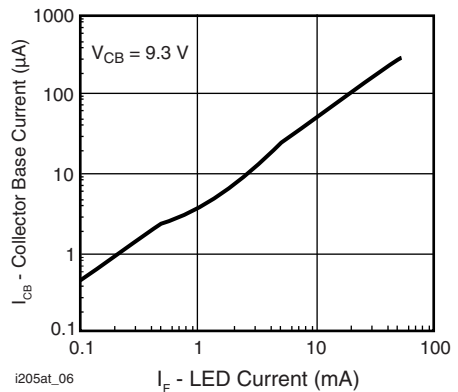


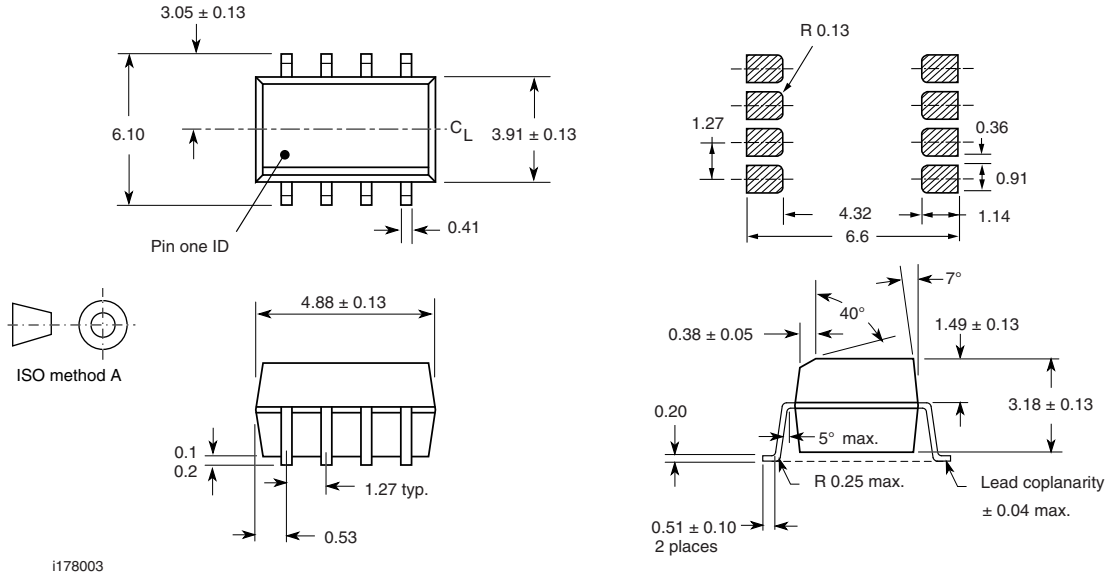
Fig. 7 - Collector Base Photocurrent vs. LED Current



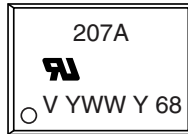
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**PACKAGE DIMENSIONS** in millimeters



**PACKAGE MARKING** (example of VO207AT)



**TAPE AND REEL PACKAGING**

Dimensions in millimeters

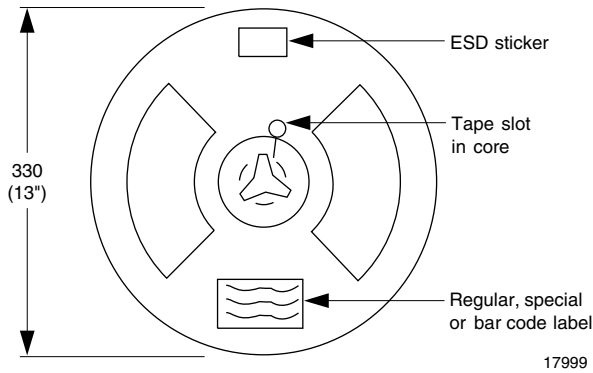


Fig. 8 - Tape and Reel Shipping Medium (EIA-481, revision A, and IEC 60286), 2000 units per reel

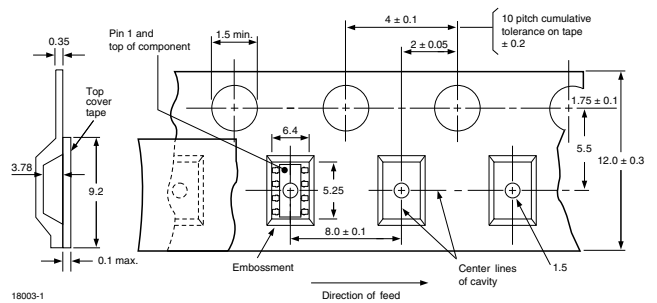


Fig. 9 - Tape Dimensions, 2000 Parts per Reel



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