



## Optocoupler, Phototransistor Output, Dual Channel, SOIC-8 Package



1179074



### FEATURES

- Two channel coupler
- SOIC-8 surface mountable package
- Standard lead spacing of 0.05"
- Available only on tape and reel option (conforms to EIA standard 481-2)
- Isolation test voltage, 4000 V<sub>RMS</sub>
- Compatible with dual wave, vapor phase and IR reflow soldering
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



RoHS COMPLIANT

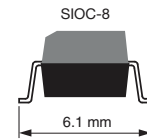
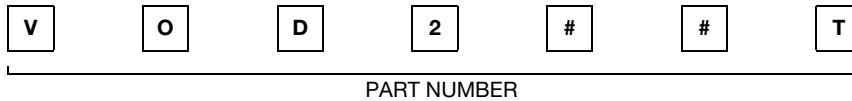
### DESCRIPTION

The VOD205T, VOD206T, VOD207T, VOD211T, VOD213T, VOD217T 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.

### 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 (%)					
	40 to 80	63 to 125	100 to 200	> 20	> 100 (1)	> 100 (2)
UL, cUL SOIC-8	VOD205T	VOD206T	VOD207T	VOD211T	VOD213T	VOD217T

### Notes

- (1) I<sub>F</sub> = 10 mA  
 (2) I<sub>F</sub> = 1 mA

### ABSOLUTE MAXIMUM RATINGS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Peak reverse voltage		V <sub>R</sub>	6	V
Peak pulsed current	1 μs, 300 pps	I <sub>FM</sub>	1	A
Continuous forward current per channel		I <sub>F</sub>	30	mA
Power dissipation		P <sub>diss</sub>	50	mW
Derate linearly from 25 °C			0.66	mW/°C
<b>OUTPUT</b>				
Collector emitter breakdown voltage		BV <sub>CEO</sub>	70	V
Emitter collector breakdown voltage		BV <sub>ECO</sub>	7	V
Continuous output current		I <sub>Cmax</sub>	50	mA
Power dissipation per channel		P <sub>diss</sub>	125	mW
Derate linearly from 25 °C			1.67	mW/°C



ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>COUPLER</b>				
Isolation test voltage	t = 1 s	V <sub>ISO</sub>	4000	V <sub>RMS</sub>
Total package dissipation ambient (2 LEDs and 2 detectors, 2 channels)		P <sub>tot</sub>	300	mW
Derate linearly from 25 °C			4	mW/°C
Storage temperature		T <sub>stg</sub>	- 40 to + 150	°C
Operating temperature		T <sub>amb</sub>	- 40 to + 100	°C
Soldering time from 260 °C <sup>(1)</sup>		T <sub>slid</sub>	10	s

**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 devices.



Fig. 1 - Power Dissipation vs. Ambient Temperature

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>		1.2	1.55	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>		25		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> = 100 μA		BV <sub>ECO</sub>	7			V
Collector emitter leakage current	V <sub>CE</sub> = 10 V, I <sub>F</sub> = 0 A		I <sub>CEO</sub>		5	50	nA
Collector emitter capacitance	V <sub>CE</sub> = 0 V		C <sub>CE</sub>		10		pF
Collector emitter saturation voltage	I <sub>F</sub> = 10 mA, I <sub>C</sub> = 2.5 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
$I_C/I_F$	$V_{CE} = 5\text{ V}, I_F = 10\text{ mA}$	VOD205T	$CTR_{DC}$	40		80	%
		VOD206T	$CTR_{DC}$	63		125	%
		VOD207T	$CTR_{DC}$	100		200	%
		VOD211T	$CTR_{DC}$	20			%
		VOD213T	$CTR_{DC}$	100			%
	$V_{CE} = 5\text{ V}, I_F = 1\text{ mA}$	VOD205T	$CTR_{DC}$	13	30		%
		VOD206T	$CTR_{DC}$	22	45		%
		VOD207T	$CTR_{DC}$	34	70		%
		VOD217T	$CTR_{DC}$	100	120		%

SWITCHING CHARACTERISTICS							
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT	
Turn-on time	$I_C = 2\text{ mA}, R_L = 100\ \Omega, V_{CC} = 5\text{ V}$	$t_{on}$		5		$\mu\text{s}$	
Turn-off time	$I_C = 2\text{ mA}, R_L = 100\ \Omega, V_{CC} = 5\text{ V}$	$t_{off}$		4		$\mu\text{s}$	
Rise time	$I_C = 2\text{ mA}, R_L = 100\ \Omega, V_{CC} = 5\text{ V}$	$t_r$		5		$\mu\text{s}$	
Fall time	$I_C = 2\text{ mA}, R_L = 100\ \Omega, V_{CC} = 5\text{ V}$	$t_f$		4		$\mu\text{s}$	

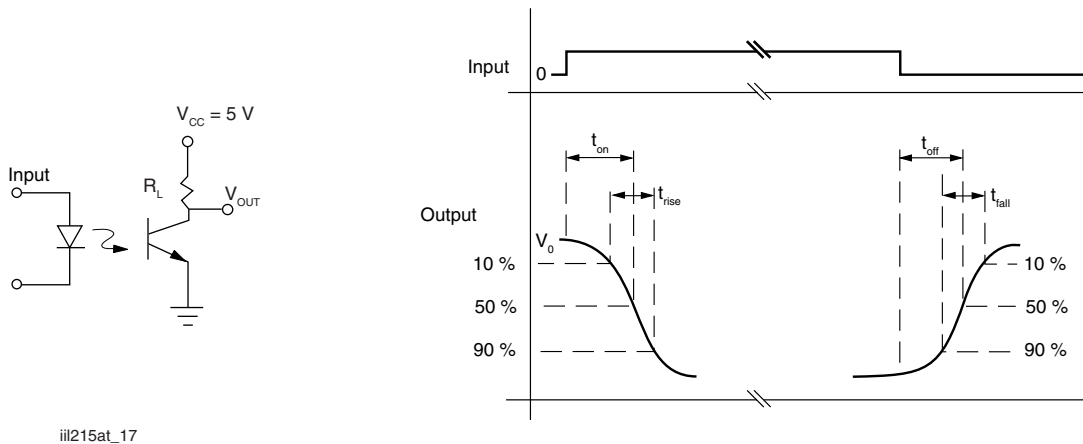


Fig. 2 - Switching Test Circuit

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} $		10 000		$\text{V}/\mu\text{s}$	
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} $		10 000		$\text{V}/\mu\text{s}$	



Fig. 3 - 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		
Polulation degree				2		
Comparative tracking index		CTI	175		399	
Peak transient overvoltage		$V_{IOTM}$	6000			V
Peak insulation voltage		$V_{IORM}$	560			V
Resistance (input to output)		$R_{IO}$		100		$G\Omega$
Apparent charge method a		$q_{pd}$				C
Apparent charge method b		$q_{pd}$				C
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
Internal creepage distance			4			mm
External clearance distance			4			mm
Insulation thickness			0.2			mm

**Note**

- 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.



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



Fig. 4 - Forward Current vs. Forward Voltage

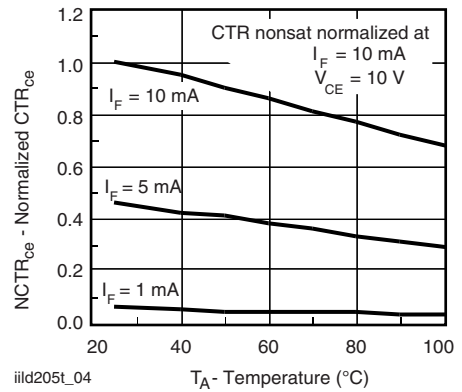


Fig. 7 - Current Transfer Ratio (normalized) vs. Ambient Temperature

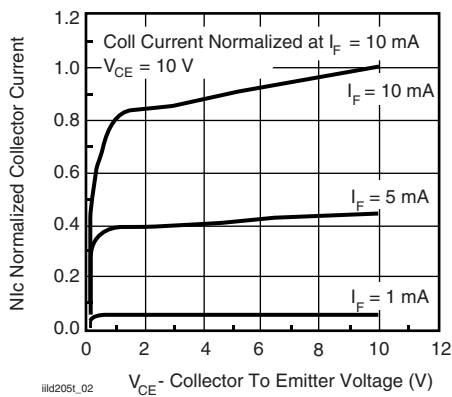


Fig. 5 - Collector Emitter Current vs.  $V_{CE}$

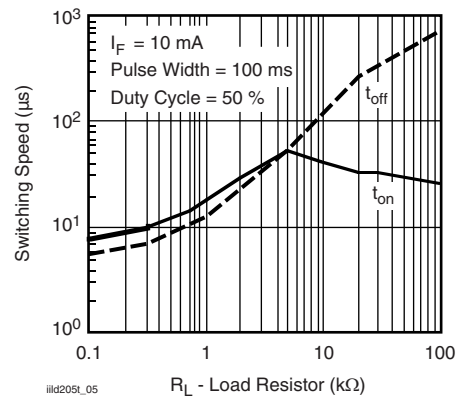


Fig. 8 - Switching Speed vs. Load Resistor

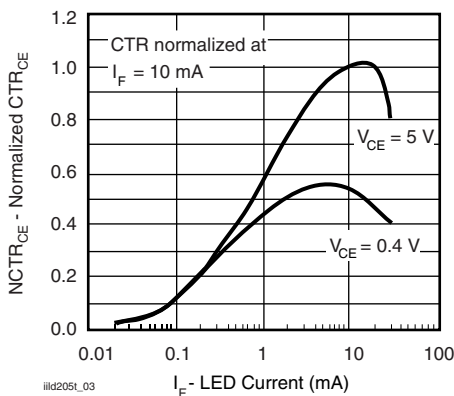


Fig. 6 - Normalized  $CTR_{CE}$  vs. Forward Current

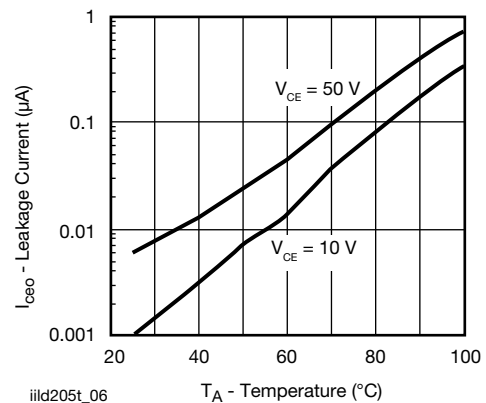
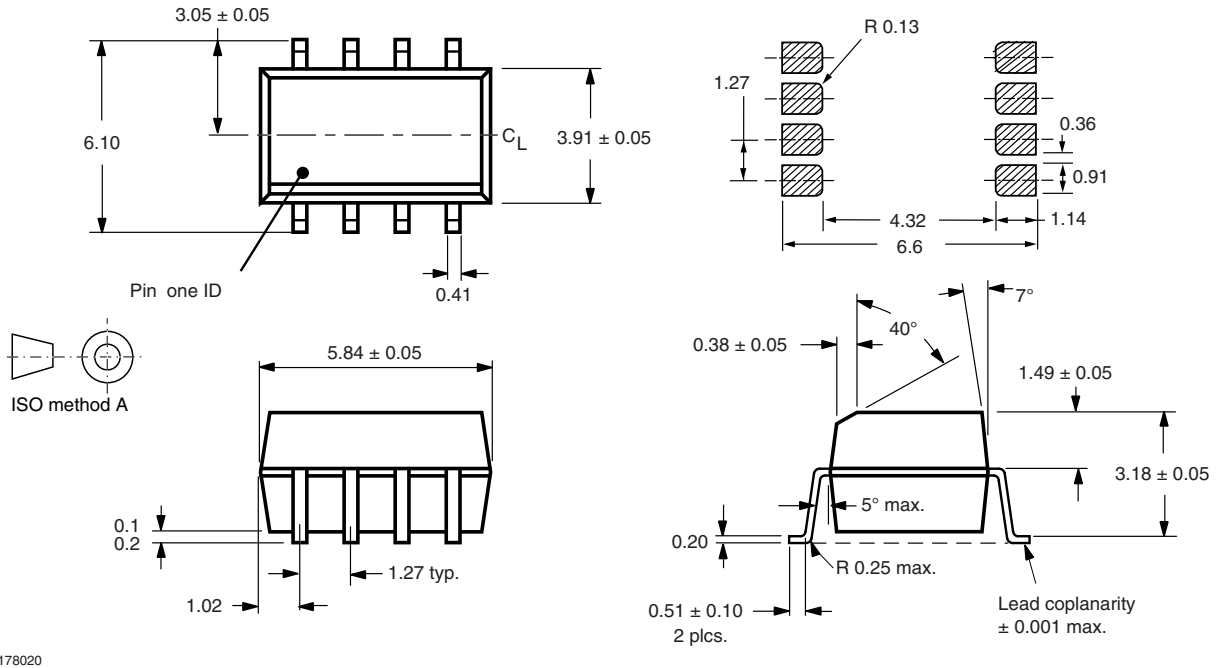


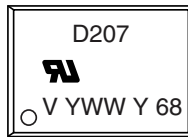
Fig. 9 - Collector Current vs. Ambient Temperature

**PACKAGE DIMENSIONS** in millimeters



i178020

**PACKAGE MARKING** (example of VOD207T)



**TAPE AND REEL PACKAGING**

Dimensions in millimeters



Fig. 10 - Tape and Reel Shipping Medium (EIA-481, revision A, and IEC 60286), 2000 units per reel

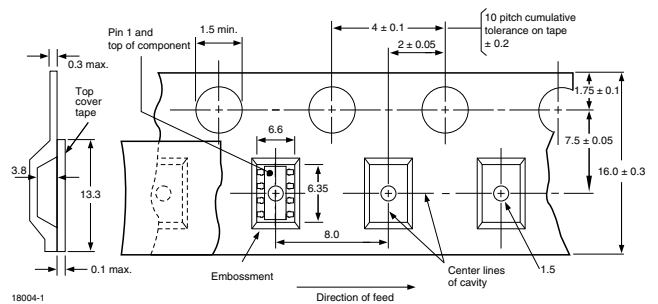


Fig. 11 - Tape Dimensions, 2000 Parts per Reel



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