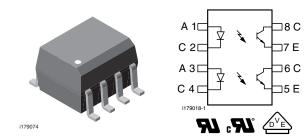


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# Optocoupler, Phototransistor Output, Dual Channel, SOIC-8 Package



### LINKS TO ADDITIONAL RESOURCES











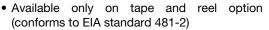


#### **DESCRIPTION**

The VOD205T, VOD206T, VOD207T, VOD211T, VOD213T, VOD217T are optically coupled pairs with a GaAs 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.

#### **FEATURES**

- Dual channel coupler
- SOIC-8 surface mountable package
- Standard lead spacing of 0s.05"





COMPLIANT

- 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 <a href="https://www.vishay.com/doc?99912">www.vishay.com/doc?99912</a>

#### **AGENCY APPROVALS**

- UL
- cUL
- DIN EN 60747-5-5 (VDE 0884-5), approved, contact customer service if this option is required

ORDERING INFORMA	<b>LION</b>					
v o	D 2	#	#	Т	sc	oic-8
	PART N	JMBER			6.	1 mm
AGENCY CERTIFIED / PACK	\GE	CTR (%)				
UL, cUL, VDE, CQC	40 to 80	63 to 125	100 to 200	> 20	> 100 <sup>(1)</sup>	> 100 <sup>(2)</sup>
SOIC-8	VOD205T	VOD206T	VOD207T	VOD211T	VOD213T	VOD217T

#### Notes

- Additional options may be possible, please contact sales office.
- $^{(1)}$   $I_F = 10 \text{ mA}$
- (2)  $I_F = 1 \text{ mA}$

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PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Peak reverse voltage		$V_{R}$	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
OUTPUT				
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
COUPLER				
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>sld</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.
- (3) Refer to reflow profile for soldering conditions for surface mounted devices

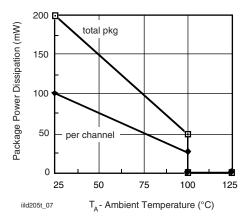


Fig. 1 - Power Dissipation vs. Ambient Temperature

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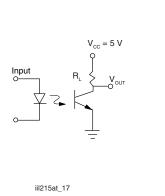
ELECTRICAL CHARACTERI	STICS (T <sub>amb</sub> = 25 °C,	unless oth	erwise sp	ecified)			
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT							
Forward voltage	I <sub>F</sub> = 10 mA		$V_{F}$	-	1.2	1.55	V
Reverse current	V <sub>R</sub> = 6 V		$I_R$	-	0.1	100	μΑ
Capacitance	$V_R = 0 V$		Co	-	25	-	pF
OUTPUT							
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	$V_{CE} = 10 \text{ V}, I_F = 0 \text{ A}$		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	$I_F = 10 \text{ mA}, I_C = 2.5 \text{ mA}$		V <sub>CEsat</sub>	-	-	0.4	V
COUPLER							
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
		VOD205T	CTR <sub>DC</sub>	40	-	80	%
		VOD206T	CTR <sub>DC</sub>	63	-	125	%
	$V_{CE} = 5 \text{ V}, I_F = 10 \text{ mA}$	VOD207T	CTR <sub>DC</sub>	100	-	200	%
		VOD211T	CTR <sub>DC</sub>	20	-	-	%
I <sub>C</sub> /I <sub>F</sub>		VOD213T	CTR <sub>DC</sub>	100	-	-	%
		VOD205T	CTR <sub>DC</sub>	13	30	-	%
	\\ - 5 \\ \ \ - 1 m^	VOD206T	CTR <sub>DC</sub>	22	45	-	%
	$V_{CE} = 5 \text{ V}, I_{F} = 1 \text{ mA}$	VOD207T	CTR <sub>DC</sub>	34	70	-	%
		VOD217T	CTR <sub>DC</sub>	100	120	-	%

SWITCHING CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Turn-on time	$I_C$ = 2 mA, $R_L$ = 100 $\Omega$ , $V_{CC}$ = 5 $V$	t <sub>on</sub>	-	5	-	μs
Turn-off time	$I_C = 2$ mA, $R_L = 100 \Omega$ , $V_{CC} = 5 V$	t <sub>off</sub>	-	4	-	μs
Rise time	$I_C = 2 \text{ mA}, R_L = 100 \Omega, V_{CC} = 5 \text{ V}$	t <sub>r</sub>	-	5	-	μs
Fall time	$I_C = 2 \text{ mA}, R_L = 100 \Omega, V_{CC} = 5 \text{ V}$	t <sub>f</sub>	-	4	-	μs



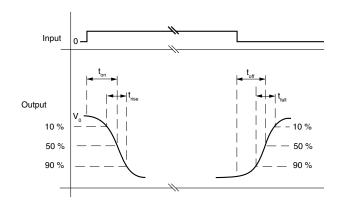


Fig. 2 - Switching Test Circuit

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COMMON MODE TRANSIENT IMMUNITY						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Common mode transient immunity at logic high	$\begin{split} V_{CM} = 1000 \; V_{P\text{-}P}, \; R_L = 1 \; k\Omega, \\ I_F = 0 \; mA \end{split}$	C <sub>MH</sub>	-	10 000	-	V/µs
Common mode transient immunity at logic low	$\begin{split} V_{CM} = 1000 \; V_{P\text{-}P},  R_L = 1 \; k\Omega, \\ I_F = 10 \; mA \end{split}$	C <sub>ML</sub>	-	10 000	-	V/µs

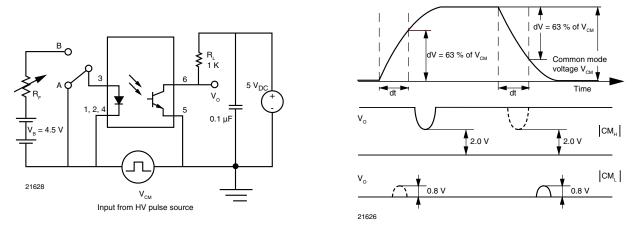


Fig. 3 - Test Circuit for Common Mode Transient Immunity

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	According to IEC 68 part 1		40 / 100 / 21	
Pollution degree	According to DIN VDE 0109		2	
Comparative tracking index	Insulation group Illa	CTI	175	
Maximum rated withstanding isolation voltage	According to UL1577, t = 1 min	V <sub>ISO</sub>	3333	V <sub>RMS</sub>
Tested withstanding isolation voltage	According to UL1577, t = 1 s	V <sub>ISO</sub>	4000	$V_{RMS}$
Maximum transient isolation voltage	According to DIN EN 60747-5-5	V <sub>IOTM</sub>	6000	V <sub>peak</sub>
Maximum repetitive peak isolation voltage	According to DIN EN 60747-5-5	V <sub>IORM</sub>	560	$V_{peak}$
Isolation resistance	$T_{amb} = 25  ^{\circ}C,  V_{IO} = 500  V$	R <sub>IO</sub>	≥ 10 <sup>12</sup>	Ω
Isolation resistance	T <sub>amb</sub> = 100 °C, V <sub>IO</sub> = 500 V	R <sub>IO</sub>	≥ 10 <sup>11</sup>	Ω
Output safety power		P <sub>SO</sub>	350	mW
Input safety current		I <sub>SI</sub>	150	mA
Input safety temperature		T <sub>S</sub>	165	°C
Creepage distance			≥ 4	mm
Clearance distance			≥ 4	mm
Insulation thickness		DTI	≥ 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.

1.2

 $V_{CE} = 0.4 \text{ V}$ 

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

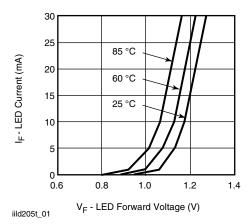
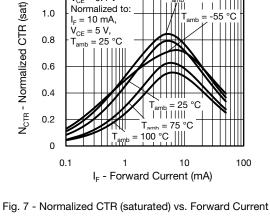


Fig. 4 - Forward Current vs. Forward Voltage



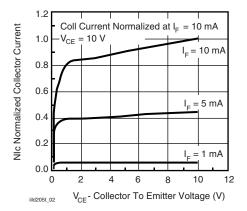


Fig. 5 - Collector Emitter Current vs. V<sub>CE</sub>

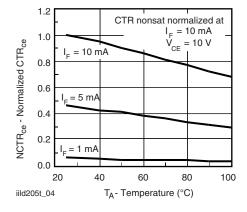


Fig. 8 - Current Transfer Ratio (normalized) vs. **Ambient Temperature** 

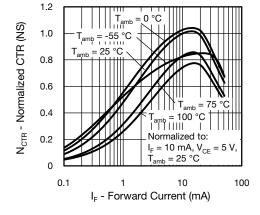


Fig. 6 - Normalized CTR (non-saturated) vs. Forward Current

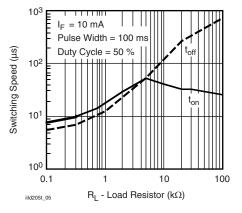


Fig. 9 - Switching Speed vs. Load Resistor

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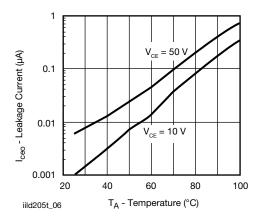
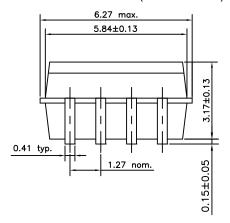
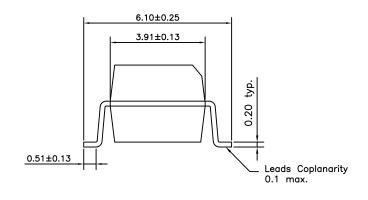
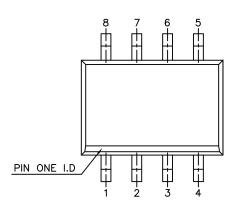


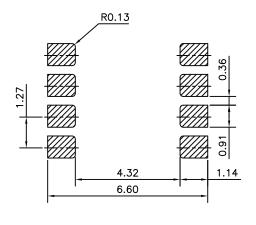
Fig. 10 - Collector Current vs. Ambient Temperature

### **PACKAGE DIMENSIONS** (in millimeters)



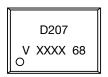






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### **PACKAGE MARKING** (example of VOD207T)



#### **Notes**

- XXXX = LMC (lot marking code)
- Tape and reel suffix (T) is not part of the package marking

#### TAPE AND REEL PACKAGING

Dimensions in millimeters

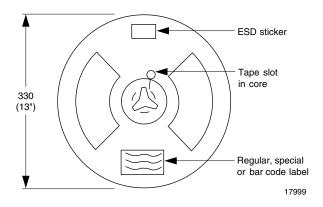


Fig. 11 - Tape and Reel Shipping Medium (EIA-481, revision A, and IEC 60286), 2000 Units per Reel

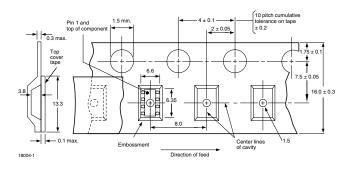


Fig. 12 - Tape Dimensions, 2000 Parts per Reel

#### **SOLDER PROFILE**

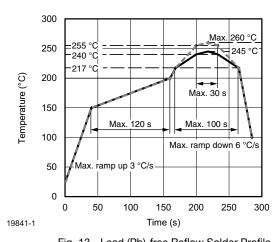


Fig. 13 - Lead (Pb)-free Reflow Solder Profile according to J-STD-020

### **HANDLING AND STORAGE CONDITIONS**

ESD level: HBM class 2 Floor life: unlimited

Conditions:  $T_{amb}$  < 30 °C, RH < 85 %

Moisture sensitivity level 1, according to J-STD-020



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