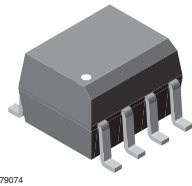
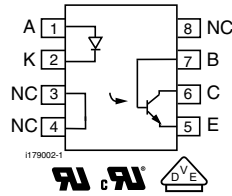




Optocoupler, Phototransistor Output, with Base Connection in SOIC-8 Package



1179074



FEATURES

- High BV<sub>CEO</sub>, 70 V
• Isolation test voltage, 4000 V<sub>RMS</sub>
• Material categorization: For definitions of compliance please see 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

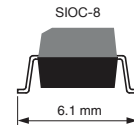
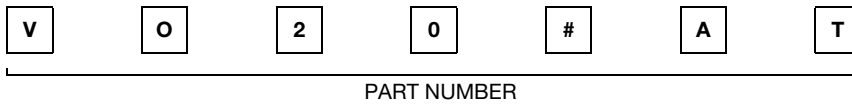


Table with columns: AGENCY CERTIFIED/PACKAGE, CTR (%), and sub-columns for UL, cUL, SOIC-8, VO205AT, VO206AT, VO207AT, VO208AT.

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

Table with columns: PARAMETER, TEST CONDITION, SYMBOL, VALUE, UNIT. Rows include INPUT, OUTPUT, and COUPLER sections.

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.

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

| PARAMETER                             | TEST CONDITION                          | PART | SYMBOL      | MIN. | TYP. | MAX. | UNIT          |
|---------------------------------------|---|------|-------------|------|------|------|---------------|
| <b>INPUT</b>                          |   |      |             |      |      |      |               |
| Forward voltage                       | $I_F = 10\text{ mA}$                    |      | $V_F$       |      | 1.3  | 1.5  | V             |
| Reverse current                       | $V_R = 6\text{ V}$                      |      | $I_R$       |      | 0.1  | 100  | $\mu\text{A}$ |
| Capacitance                           | $V_R = 0\text{ V}$                      |      | $C_O$       |      | 13   |      | pF            |
| <b>OUTPUT</b>                         |   |      |             |      |      |      |               |
| Collector emitter breakdown voltage   | $I_C = 100\text{ }\mu\text{A}$          |      | $BV_{CEO}$  | 70   |      |      | V             |
| Emitter collector breakdown voltage   | $I_E = 10\text{ }\mu\text{A}$           |      | $BV_{ECO}$  | 7    | 10   |      | V             |
| Collector base breakdown voltage      | $I_C = 100\text{ }\mu\text{A}$          |      | $BV_{CBO}$  | 100  |      |      | V             |
| Collector base current                |   |      | $I_{CBO}$   |      |      | 1    | nA            |
| Emitter base current                  |   |      | $I_{EBO}$   |      |      | 1    | nA            |
| Collector emitter leakage current     | $V_{CE} = 10\text{ V}$                  |      | $I_{CEO}$   |      | 5    | 50   | nA            |
| Saturation voltage, collector emitter | $I_C = 2\text{ mA}, I_F = 10\text{ mA}$ |      | $V_{CEsat}$ |      |      | 0.4  | V             |
| <b>COUPLER</b>                        |   |      |             |      |      |      |               |
| Capacitance, input to output          |   |      | $C_{IO}$    |      | 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 |
|-----------|---|---------|--------|------|------|------|------|
| $I_C/I_F$ | $I_F = 10\text{ mA}, V_{CE} = 5\text{ V}$ | 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  | $I_C = 2\text{ mA}, R_L = 100\text{ }\Omega, V_{CC} = 10\text{ V}$ |      | $t_{on}$  |      | 3    |      | $\mu\text{s}$ |
| Turn-off time | $I_C = 2\text{ mA}, R_L = 100\text{ }\Omega, V_{CC} = 10\text{ V}$ |      | $t_{off}$ |      | 3    |      | $\mu\text{s}$ |
| Rise time     | $I_C = 2\text{ mA}, R_L = 100\text{ }\Omega, V_{CC} = 10\text{ V}$ |      | $t_r$     |      | 3    |      | $\mu\text{s}$ |
| Fall time     | $I_C = 2\text{ mA}, R_L = 100\text{ }\Omega, V_{CC} = 10\text{ V}$ |      | $t_f$     |      | 2    |      | $\mu\text{s}$ |

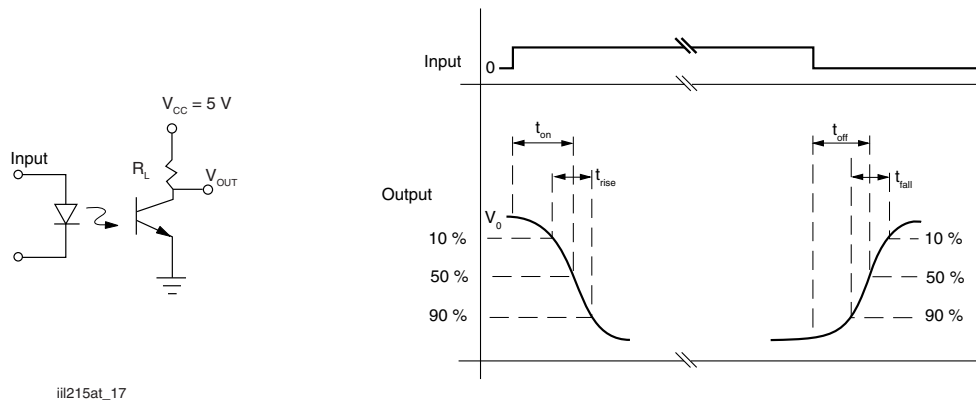


Fig. 1 Switching Test Circuit

**COMMON MODE TRANSIENT IMMUNITY**

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

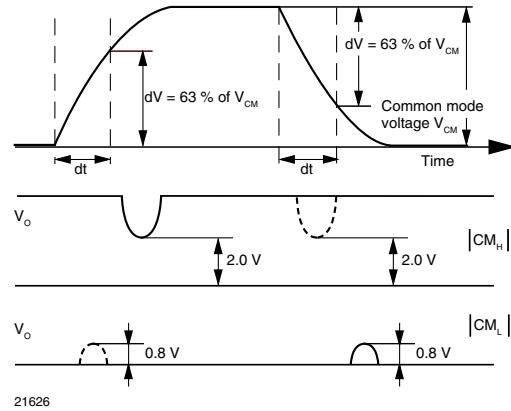
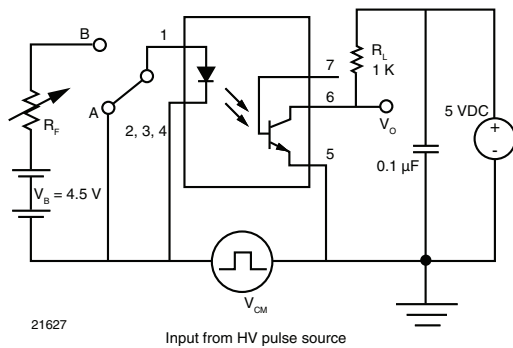


Fig. 1 - Test Circuit for Common Mode Transient Immunity

**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  | $^{\circ}\text{C}$ |
| 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.



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

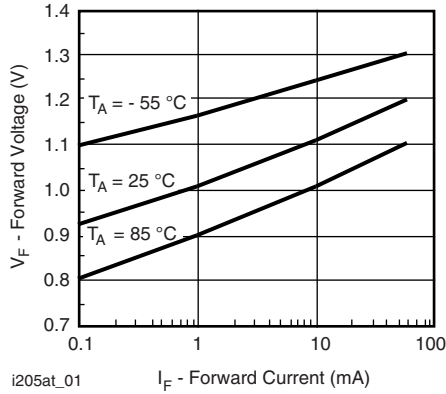


Fig. 2 - Forward Voltage vs. Forward Current

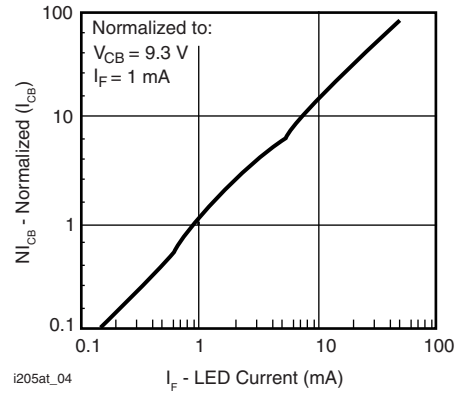


Fig. 5 - Normalized Collector-Base Photocurrent vs. LED Current

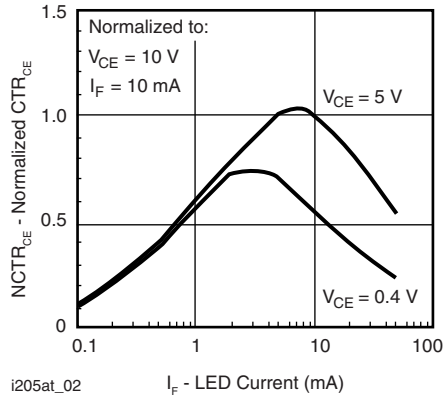


Fig. 3 - Normalized Non-Saturated and Saturated CTR<sub>CE</sub> vs. LED Current

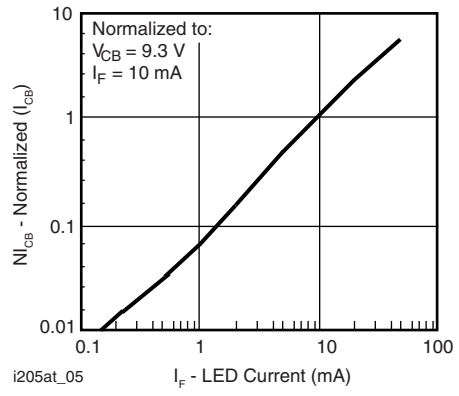


Fig. 6 - Normalized Collector-Base Photocurrent vs. LED Current

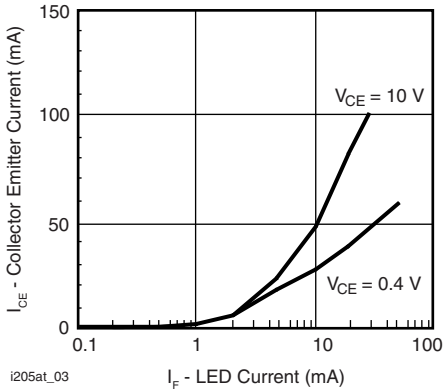


Fig. 4 - Collector Emitter Current vs. LED Current

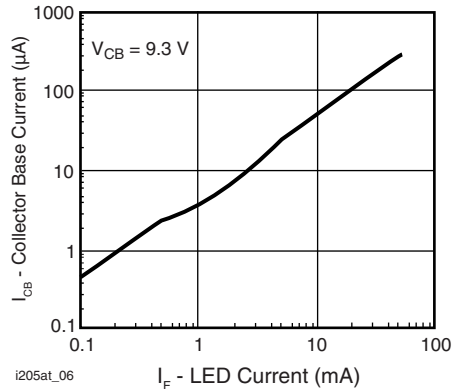
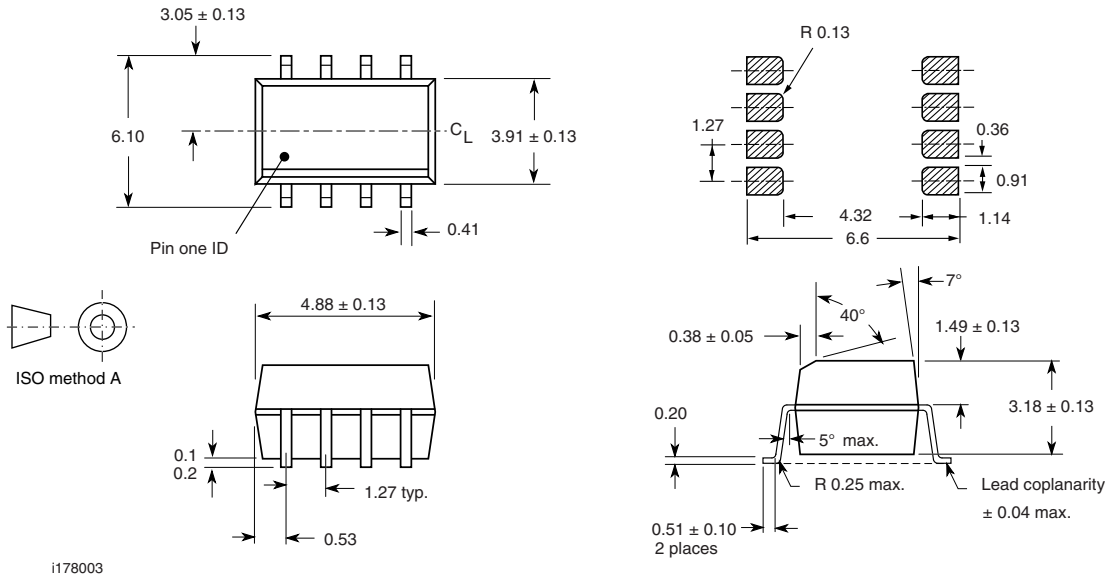
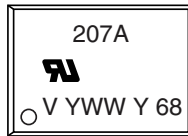


Fig. 7 - Collector Base Photocurrent vs. LED Current

## PACKAGE DIMENSIONS in millimeters



## PACKAGE MARKING (example of VO207AT)



## TAPE AND REEL PACKAGING

Dimensions in millimeters

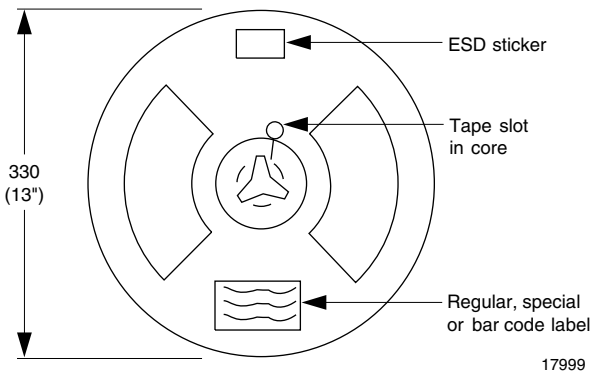


Fig. 8 - Tape and Reel Shipping Medium (EIA-481, revision A, and IEC 60286), 2000 units per reel

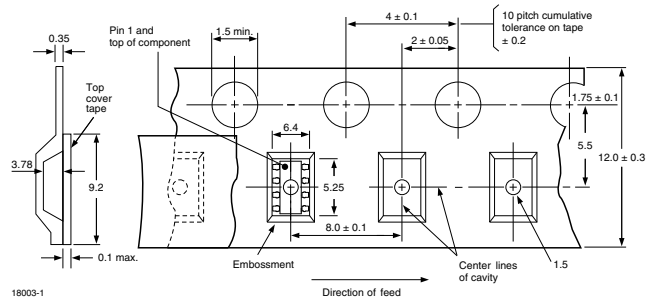


Fig. 9 - Tape Dimensions, 2000 Parts per Reel



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