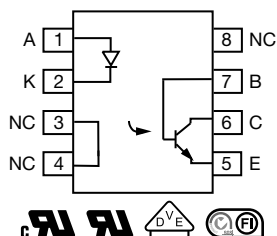
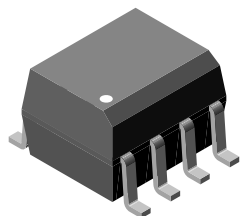


## Optocoupler, Phototransistor Output, With Base Connection in SOIC-8 Package



### FEATURES

- High  $BV_{CEO}$ , 70 V
- Isolation test voltage, 4000  $V_{RMS}$
- Industry standard SOIC-8A surface mountable package
- 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

### LINKS TO ADDITIONAL RESOURCES



### DESCRIPTION

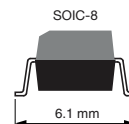
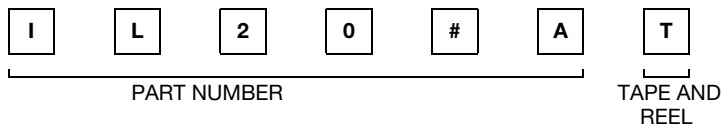
The IL205AT, IL206AT, IL207AT, IL208AT are optically coupled pairs with a gallium arsenide infrared LED and a silicon NPN phototransistor. Signal information, including a DC level, can be transmitted by the device while maintaining a high degree of electrical isolation between input and output. This family comes in a standard SOIC-8 small outline package for surface mounting which makes them ideally suited for high density application with limited space. In addition to eliminating through-hole requirements, this package conforms to standards for surface mounted devices.

A specified minimum and maximum CTR allows a narrow tolerance in the electrical design of the adjacent circuits. The high  $BV_{CEO}$  of 70 V gives a higher safety margin compared to the industry standard 30 V.

### AGENCY APPROVALS

- [UL](#)
- [cUL](#)
- [DIN EN 60747-5-5 \(VDE 0884\)](#), available with option 1
- [FIMKO](#)

### ORDERING INFORMATION



| AGENCY CERTIFIED / PACKAGE            | CTR (%)         |                  |                   |                   |
|---------------------------------------|-----------------|------------------|-------------------|-------------------|
|                                       | 10 mA           |                  |                   |                   |
| <b>UL, cUL, FIMKO</b>                 | <b>40 to 80</b> | <b>63 to 125</b> | <b>100 to 200</b> | <b>160 to 320</b> |
| SOIC-8                                | IL205AT         | IL206AT          | IL207AT           | IL208AT           |
| <b>UL, cUL, FIMKO, VDE (option 1)</b> | <b>40 to 80</b> | <b>63 to 125</b> | <b>100 to 200</b> | <b>160 to 320</b> |
| SOIC-8                                | -               | -                | IL207A-X001T      | -                 |

#### Note

- Additional options may be possible, please contact sales office



| <b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , 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        |
| Power dissipation                                                                                      |                   | $P_{diss}$     | 90          | mW        |
| Derate linearly from 25 °C                                                                             |                   |                | 1.2         | mW/°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 °C                                                                             |                   |                | 2           | mW/°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 °C                                                                             |                   |                | 3.3         | mW/°C     |
| Operating temperature                                                                                  |                   | $T_{amb}$      | -55 to +100 | °C        |
| Storage temperature                                                                                    |                   | $T_{stg}$      | -55 to +150 | °C        |
| Soldering time                                                                                         | At 260 °C         |                | 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.

| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                         |             |      |      |      |                  |
|----------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------|------|------|------|------------------|
| PARAMETER                                                                                                | TEST CONDITION                          | 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                                                                      | $I_E = 100\text{ }\mu\text{A}$          | $BV_{ECO}$  | 7    | 10   | -    | V                |
| Collector emitter leakage current                                                                        | $V_{CE} = 10\text{ V}$                  | $I_{CEO}$   | -    | 5    | 50   | nA               |
| <b>COUPLER</b>                                                                                           |                                         |             |      |      |      |                  |
| Saturation voltage, collector emitter                                                                    | $I_C = 2\text{ mA}, I_F = 10\text{ mA}$ | $V_{CEsat}$ | -    | -    | 0.4  | V                |
| Capacitance, input to output                                                                             |                                         | $C_{IO}$    | -    | 0.5  | -    | pF               |
| Resistance, input to output                                                                              |                                         | $R_{IO}$    | -    | 100  | -    | $\text{G}\Omega$ |

**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 |
|------------------------|------------------------------------------------|---------|--------|------|------|------|------|
| Current transfer ratio | $I_F = 10 \text{ mA}$ , $V_{CE} = 5 \text{ V}$ | IL205AT | CTR    | 40   | -    | 80   | %    |
|                        |                                                | IL206AT | CTR    | 63   | -    | 125  | %    |
|                        |                                                | IL207AT | CTR    | 100  | -    | 200  | %    |
|                        |                                                | IL208AT | CTR    | 100  | -    | 320  | %    |
|                        | $I_F = 1 \text{ mA}$ , $V_{CE} = 5 \text{ V}$  | IL205AT | CTR    | 13   | 25   | -    | %    |
|                        |                                                | IL206AT | CTR    | 22   | 40   | -    | %    |
|                        |                                                | IL207AT | CTR    | 34   | 60   | -    | %    |
|                        |                                                | IL208AT | CTR    | 56   | 95   | -    | %    |

**SWITCHING CHARACTERISTICS**

| PARAMETER      | TEST CONDITION                                                         | PART | SYMBOL               | MIN. | TYP. | MAX. | UNIT          |
|----------------|------------------------------------------------------------------------|------|----------------------|------|------|------|---------------|
| Switching time | $I_C = 2 \text{ mA}$ , $R_L = 100 \Omega$ ,<br>$V_{CC} = 10 \text{ V}$ |      | $t_{on}$ , $t_{off}$ | -    | 3    | -    | $\mu\text{s}$ |

**SAFETY AND INSULATION RATINGS**

| PARAMETER                       | TEST CONDITION                                                        | SYMBOL     | MIN. | TYP.          | MAX. | UNIT               |
|---------------------------------|-----------------------------------------------------------------------|------------|------|---------------|------|--------------------|
| Climatic classification         | According to IEC 68 part 1                                            |            | -    | 55 / 110 / 21 | -    |                    |
| Pollution degree (DIN VDE 0109) |                                                                       |            | -    | 2.0           | -    |                    |
| Comparative tracking index      |                                                                       | CTI        | 175  | -             | 399  |                    |
| $V_{IOTM}$                      | DIN IEC 112 / VDE 0303 part 1,<br>group IIIa per DIN VDE 6110 175 399 | $V_{IOTM}$ | 6000 | -             | -    | V                  |
| $V_{IORM}$                      |                                                                       | $V_{IORM}$ | 560  | -             | -    | V                  |
| Resistance (input to output)    |                                                                       | $R_{IO}$   | -    | $10^{12}$     | -    | $\Omega$           |
| $P_{SI}$                        |                                                                       |            | -    | -             | 350  | mW                 |
| $I_{SI}$                        |                                                                       |            | -    | -             | 150  | mA                 |
| $T_{SI}$                        |                                                                       |            | -    | -             | 165  | $^{\circ}\text{C}$ |
| Creepage distance               |                                                                       |            | 4.0  | -             | -    | mm                 |
| Clearance distance              |                                                                       |            | 4.0  | -             | -    | mm                 |

**Note**

- As per IEC 60747-5-5, §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.

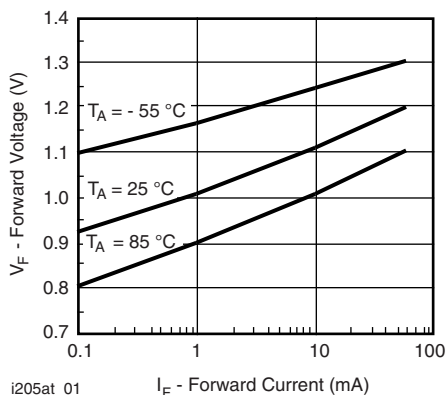
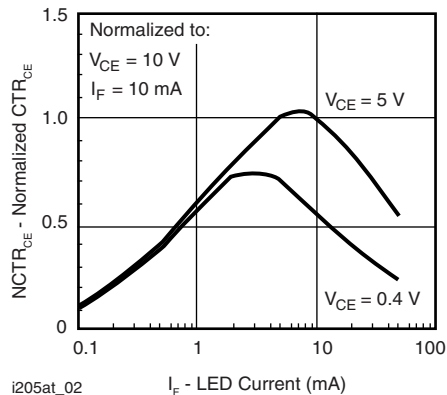
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Forward Voltage vs. Forward Current


Fig. 2 - Normalized Non-Saturated and Saturated  $CTR_{CE}$  vs. LED Current

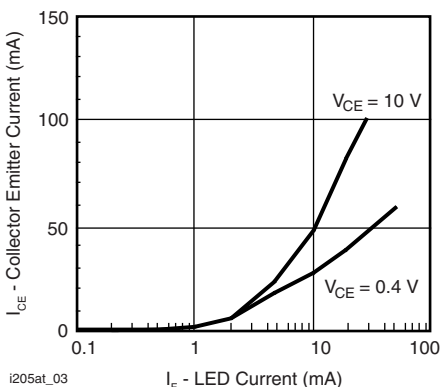


Fig. 3 - Collector Emitter Current vs. LED Current

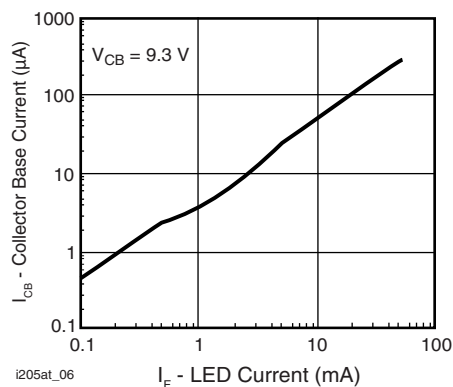


Fig. 6 - Collector Emitter Photocurrent vs. LED Current

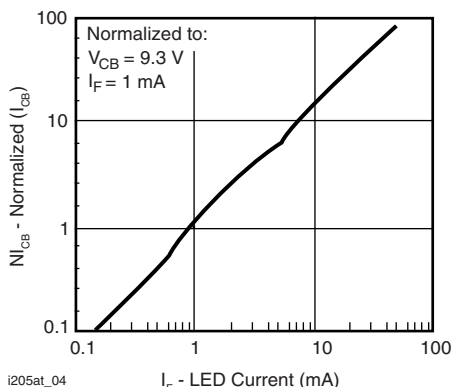


Fig. 4 - Normalized Collector-Base Photocurrent vs. LED Current

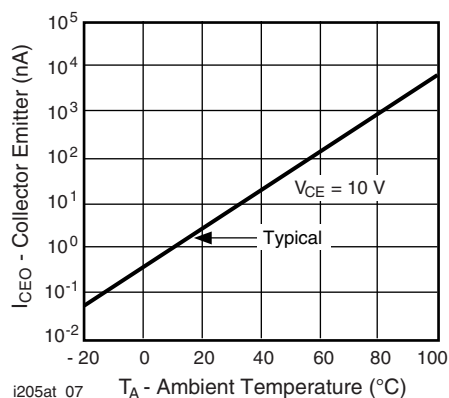


Fig. 7 - Collector Emitter Photocurrent vs. LED Current

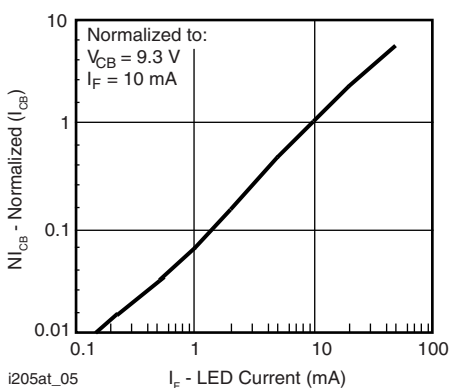
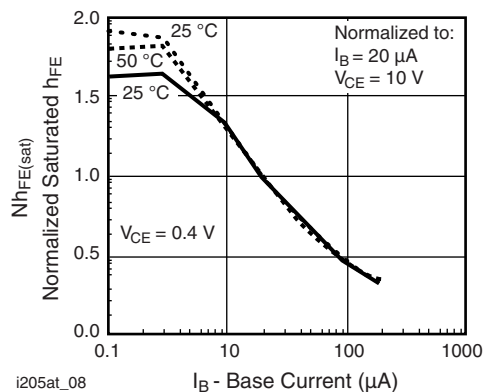


Fig. 5 - Normalized Collector-Base Photocurrent vs. LED Current


Fig. 8 - Base Current vs.  $I_F$  and  $h_{FE}$

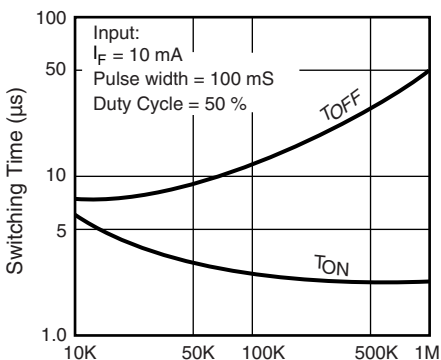
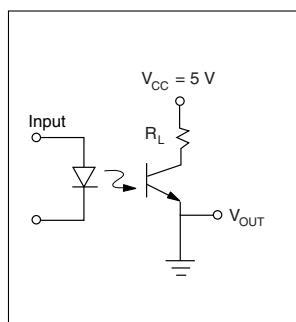

i205at\_09 Base Emitter Resistance,  $R_{BE}$  ( $\Omega$ )

Fig. 9 - Typical Switching Characteristics vs. Base Resistance (Saturated Operation)



i205at\_11

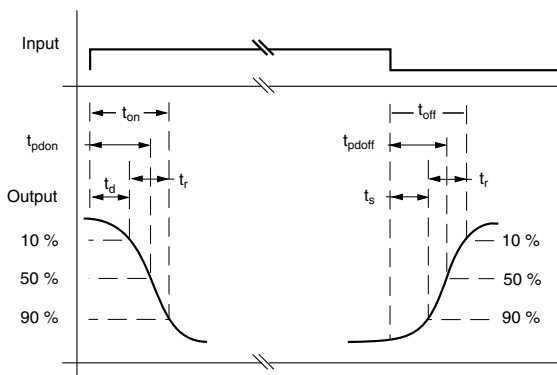


Fig. 10 - Switching Test Circuit

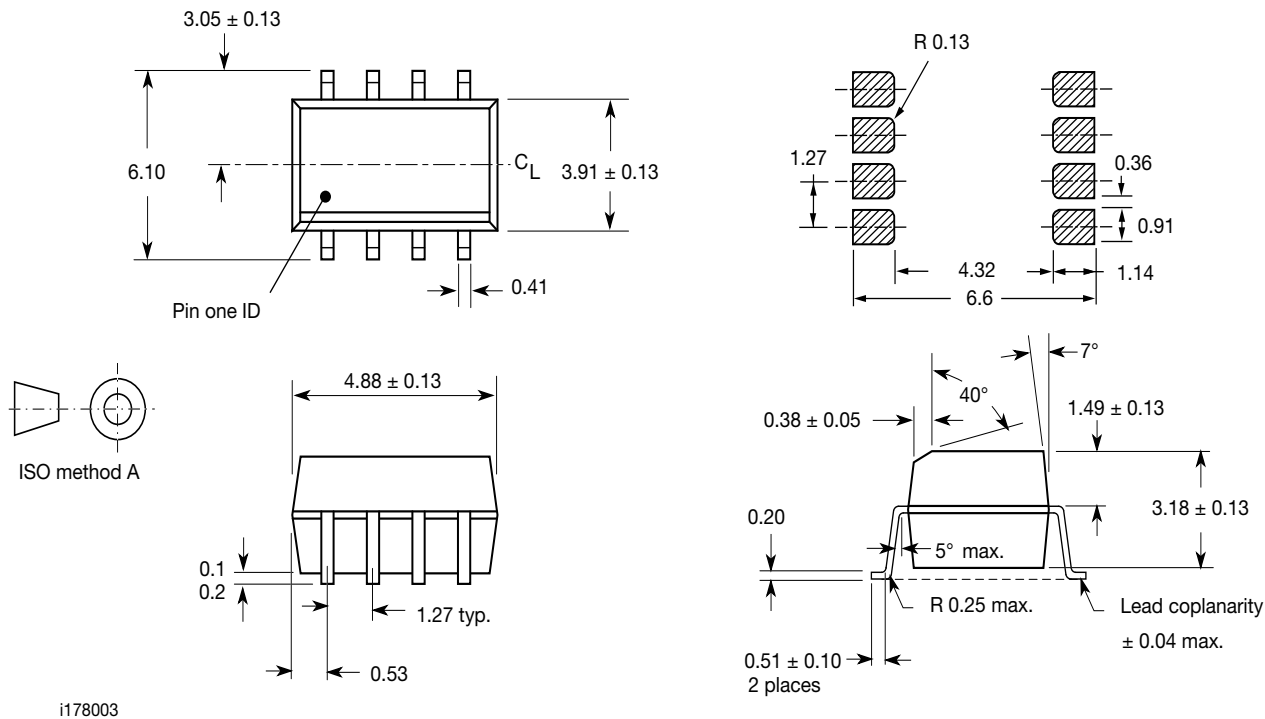
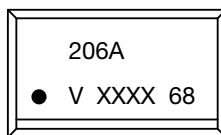
**PACKAGE DIMENSIONS** in millimeters

**PACKAGE MARKING** (example)


Fig. 11 - Example of IL206AT

**Notes**

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



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