

# CNC7S101, CNZ3182, CNC7T101, CNC1H101 (ON3181, ON3182, ON3183, ON3184)

## Optoisolators

### Overview

CNC7S101 is an AC input compatible optoisolator in which two GaAs high output infrared light emitting diode chips are connected in reverse parallel as light emitting elements, and optically are connected to a high sensitivity Si phototransistor chip as a light detecting element in a small DIL 4-pin package.

This optoisolator series also includes the two-channel CNZ3182, the three-channel CNC7T101, and the four-channel CNC1H101.

The CNC7S101 series has a number of excellent features, including high I/O isolation voltage and current transfer ratio (CTR), as well as high speed response and high reliability.

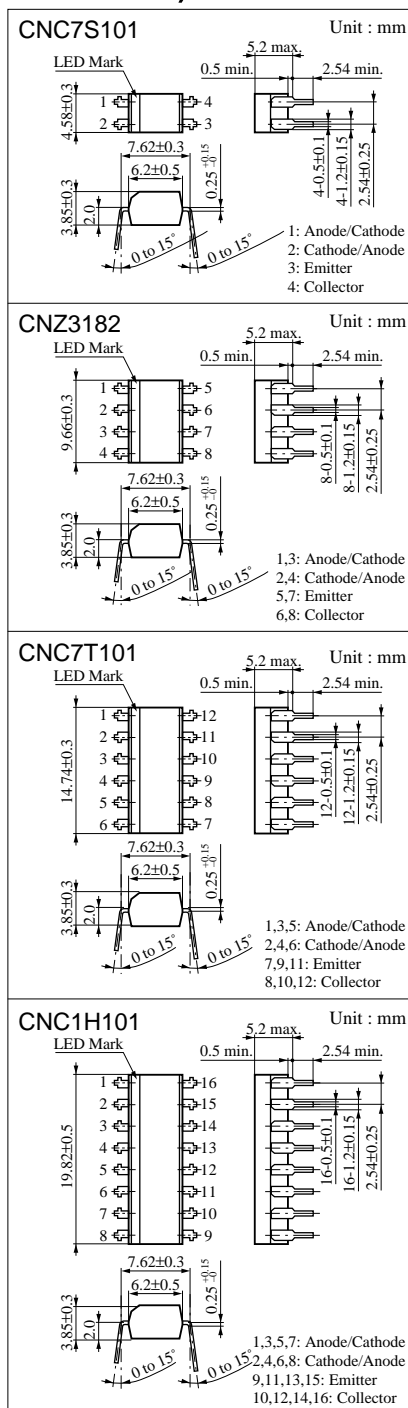
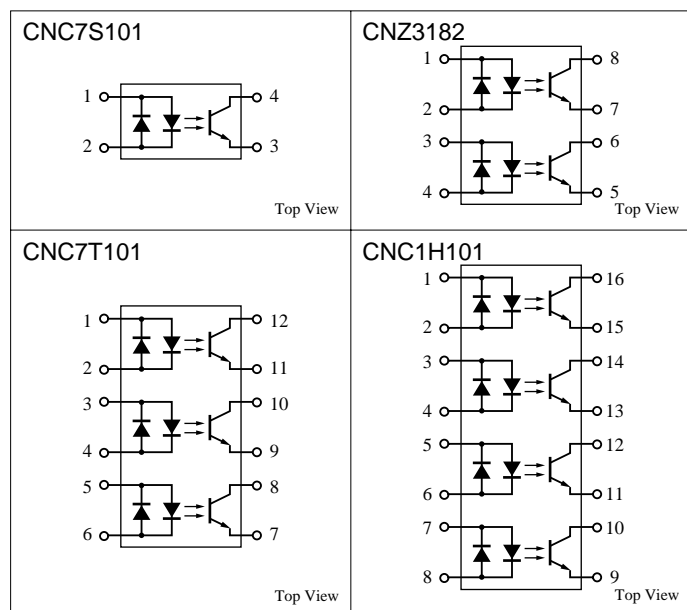
### Features

- AC input support
- High I/O isolation voltage :  $V_{ISO} = 5000 V_{rms}$  (min.)
- Fast response :  $t_r = 4 \mu s$ ,  $t_f = 3 \mu s$
- UL listed (UL File No. E79920)

### Applications

- Telephones
- Telephone switches
- Programmable controllers
- AC/DC input modules for measuring

### Pin Connection



Note) The part numbers in the parenthesis show conventional part number.

■ Absolute Maximum Ratings (Ta = 25°C)

| Parameter                          |                              | Symbol                         | Ratings     | Unit             |
|------------------------------------|------------------------------|--------------------------------|-------------|------------------|
| Input (Light emitting diode)       | Forward current (DC)         | I <sub>F</sub>                 | ±50         | mA               |
|                                    | Pulse forward current        | I <sub>FP</sub> <sup>*1</sup>  | ±1          | A                |
|                                    | Power dissipation            | P <sub>D</sub> <sup>*2</sup>   | 75          | mW               |
| Output (Photo transistor)          | Collector current            | I <sub>C</sub>                 | 50          | mA               |
|                                    | Collector to emitter voltage | V <sub>CEO</sub>               | 80          | V                |
|                                    | Emitter to collector voltage | V <sub>ECO</sub>               | 7           | V                |
|                                    | Collector power dissipation  | P <sub>C</sub> <sup>*3</sup>   | 150         | mW               |
| Total power dissipation            |                              | P <sub>T</sub>                 | 200         | mW               |
| Isolation voltage, input to output |                              | V <sub>ISO</sub> <sup>*4</sup> | 5000        | V <sub>rms</sub> |
| Operating ambient temperature      |                              | T <sub>opr</sub>               | -30 to +100 | °C               |
| Storage temperature                |                              | T <sub>stg</sub>               | -55 to +125 | °C               |

<sup>\*1</sup> Pulse width ≤ 100 μs, repeat 100 pps

<sup>\*2</sup> Input power derating ratio is 0.75 mW/°C at Ta ≥ 25°C.

<sup>\*3</sup> Output power derating ratio is 1.5 mW/°C at Ta ≥ 25°C.

<sup>\*4</sup> AC 1 min. RH < 60 %

■ Electrical Characteristics (Ta = 25°C)

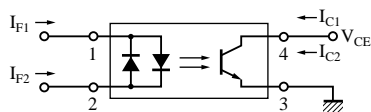
| Parameter                |   | Symbol                              | Conditions                                   | min              | typ  | max | Unit |
|--------------------------|---|-------------------------------------|--|------------------|------|-----|------|
| Input characteristics    | Forward voltage (DC)                    | V <sub>F</sub>                      | I <sub>F</sub> = ±50mA                       |                  | 1.35 | 1.5 | V    |
|                          | Capacitance between pins                | C <sub>i</sub>                      | V <sub>R</sub> = 0V, f = 1MHz                |                  | 35   |     | pF   |
| Output characteristics   | Collector cutoff current                | I <sub>CEO</sub>                    | V <sub>CE</sub> = 20V                        |                  | 5    | 100 | nA   |
|                          | Collector to emitter voltage            | V <sub>CEO</sub>                    | I <sub>C</sub> = 100μA                       | 80               |      |     | V    |
|                          | Emitter to collector voltage            | V <sub>ECO</sub>                    | I <sub>E</sub> = 10μA                        | 7                |      |     | V    |
|                          | Collector to emitter capacitance        | C <sub>C</sub>                      | V <sub>CE</sub> = 10V, f = 1MHz              |                  | 3    |     | pF   |
| Transfer characteristics | DC current transfer ratio               | CTR <sup>*1,5</sup>                 | V <sub>CE</sub> = 5V, I <sub>F</sub> = ±1mA  | 20               |      | 300 | %    |
|                          | Isolation capacitance, input to output  | C <sub>ISO</sub>                    | f = 1MHz                                     |                  | 0.6  |     | pF   |
|                          | Isolation resistance, input to output   | R <sub>ISO</sub>                    | V <sub>ISO</sub> = 500V                      | 10 <sup>11</sup> |      |     | Ω    |
|                          | Rise time                               | t <sub>r</sub> <sup>*2</sup>        | V <sub>CC</sub> = 10V, I <sub>C</sub> = 2mA, |                  | 4    |     | μs   |
|                          | Fall time                               | t <sub>f</sub> <sup>*3</sup>        | R <sub>L</sub> = 100Ω                        |                  | 3    |     | μs   |
|                          | Collector to emitter saturation voltage | V <sub>CE(sat)</sub>                | I <sub>F</sub> = ±20mA, I <sub>C</sub> = 1mA |                  | 0.1  | 0.2 | V    |
|                          | Collector current ratio                 | I <sub>C(Ratio)</sub> <sup>*4</sup> | V <sub>CE</sub> = 5V, I <sub>F</sub> = 1mA   | 0.33             | 1.0  | 3.0 | —    |

<sup>\*1</sup> DC current transfer ratio (CTR) is a ratio of output current against DC input current

<sup>\*2</sup> t<sub>r</sub> : Time required for the collector current to increase from 10% to 90% of its final value

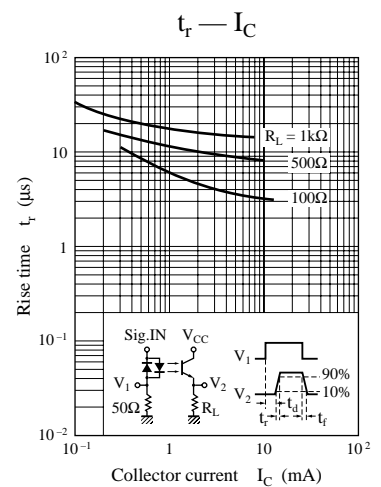
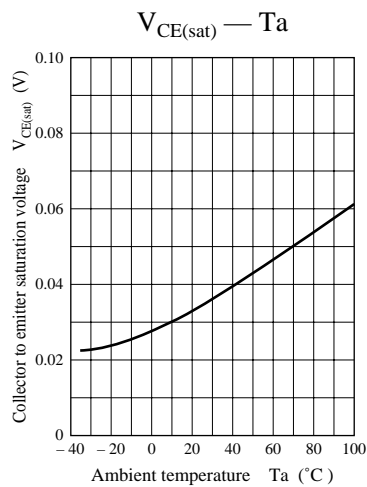
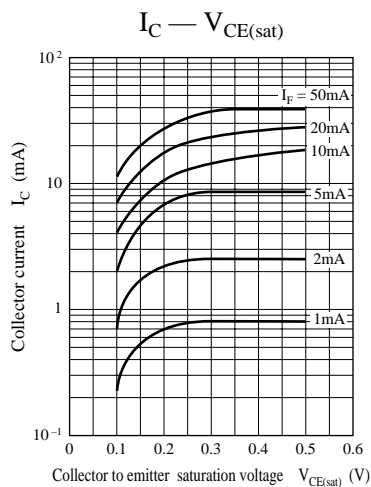
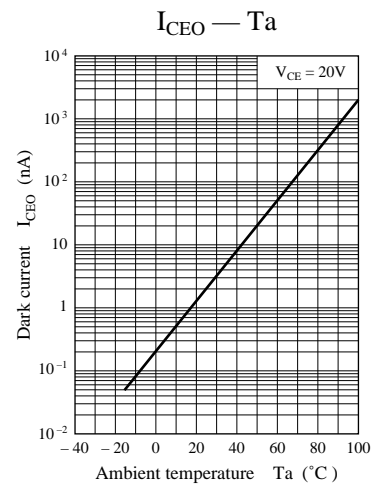
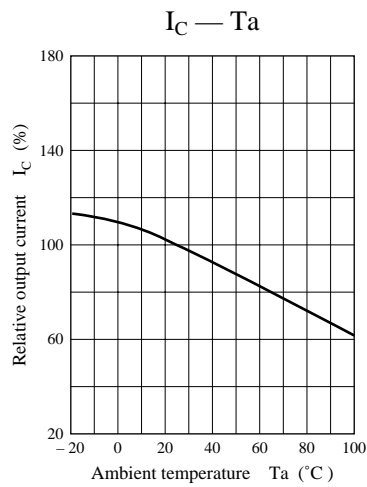
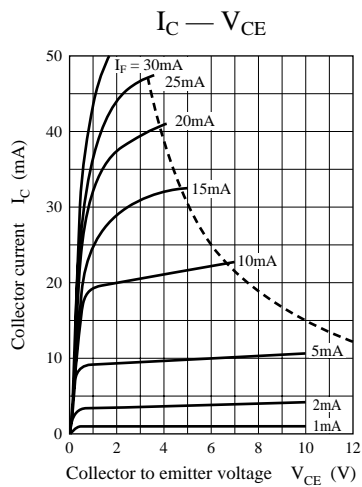
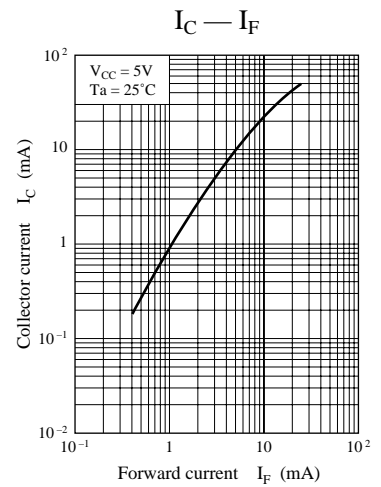
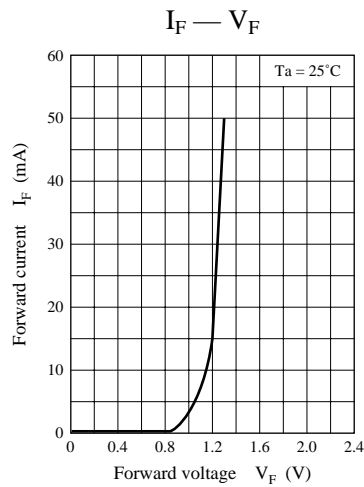
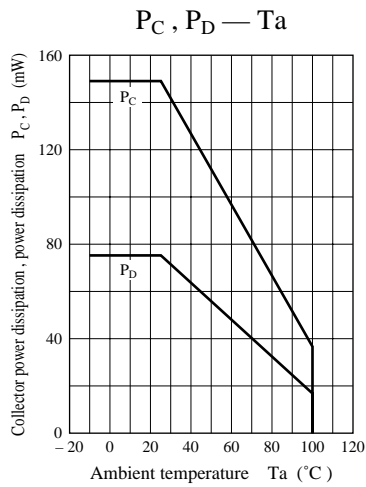
<sup>\*3</sup> t<sub>f</sub> : Time required for the collector current to decrease from 90% to 10% of its initial value

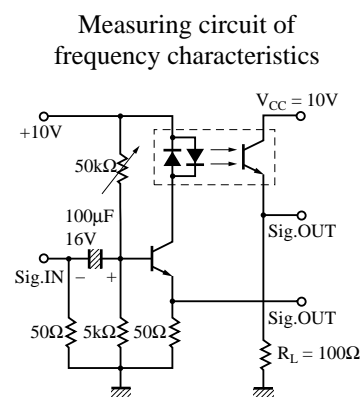
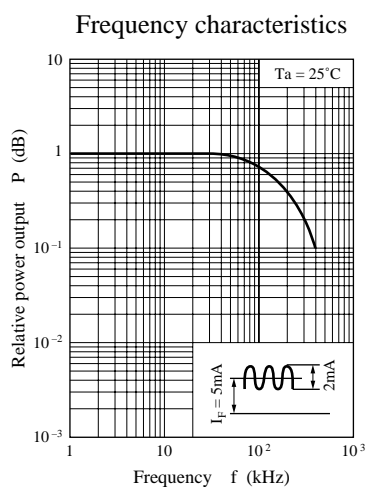
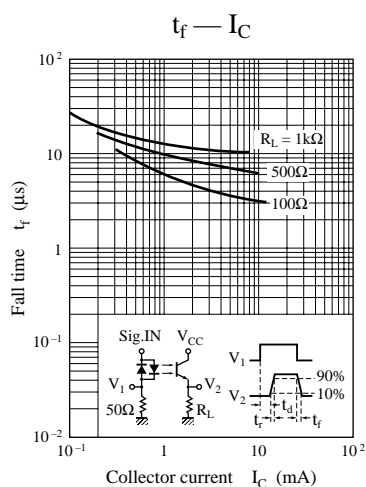
$$^{*4} I_{C(Ratio)} = \frac{I_{C2} (I_F = I_{F2}, V_{CE} = 5V)}{I_{C1} (I_F = I_{F1}, V_{CE} = 5V)}$$



<sup>\*5</sup> CTR classifications

| Class   | General   | R         | S          |
|---------|-----------|-----------|------------|
| CTR (%) | 20 to 300 | 50 to 150 | 100 to 300 |





# Caution for Safety

 **DANGER**

Gallium arsenide material (GaAs) is used in this product.

Therefore, do not burn, destroy, cut, crush, or chemically decompose the product, since gallium arsenide material in powder or vapor form is harmful to human health.

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