

# PC865 Series

## High Sensitivity, Low Collector Dark Current, High Collector-emitter Voltage Type Photocoupler

### ■ Features

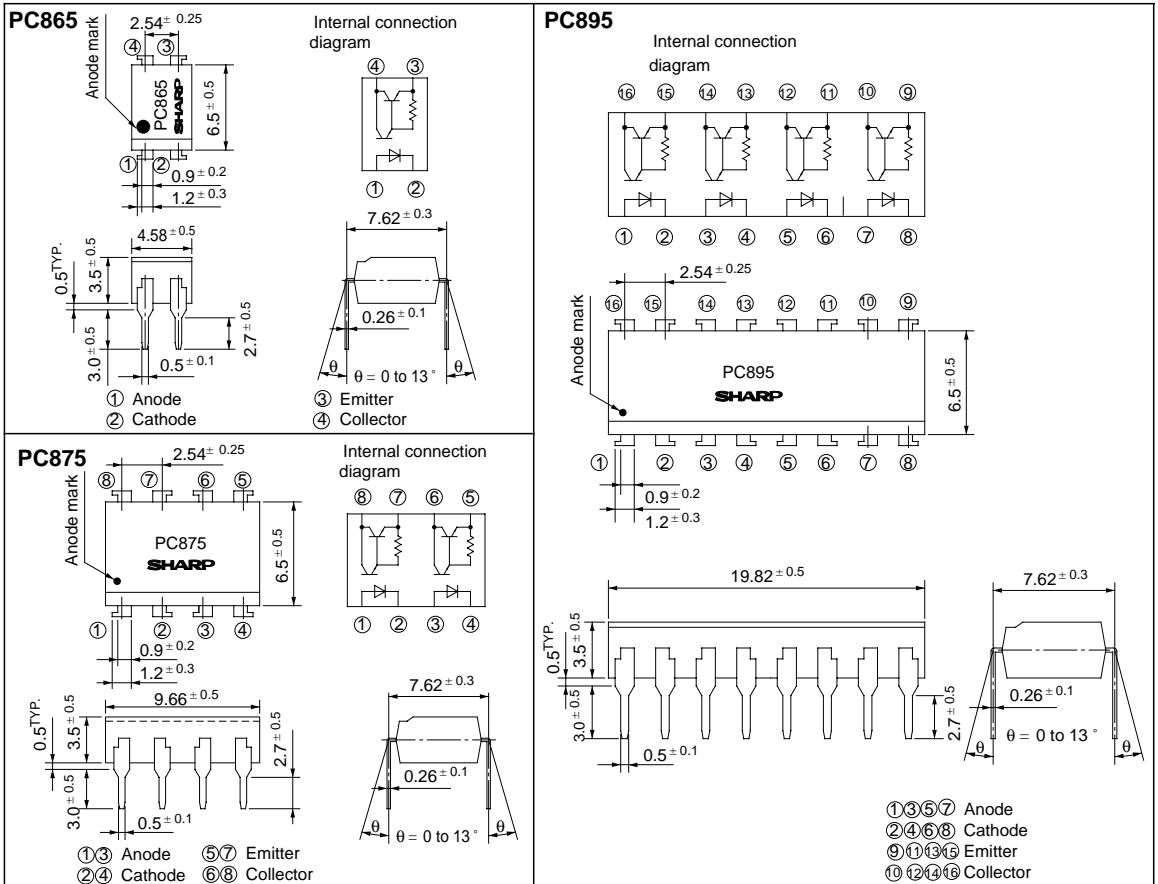
1. Low collector dark current  
( $I_{CEO}$  : MAX.  $10 \mu A$  at  $V_{CE} = 24V$ ,  $T_a = 85^\circ C$  )
2. High current transfer ratio  
(CTR : MIN. 1 000% at  $I_F = 1mA$ ,  $V_{CE} = 2V$ )
3. High collector-emitter voltage ( $V_{CEO}$  : 70V)
4. High isolation voltage between input and output ( $V_{iso}$  : 5 000V<sub>rms</sub>)
5. Compact dual-in-line package  
**PC865** (1-channel ) **PC875** (2-channel )  
**PC895** (4-channel )
6. Recognized by UL, file No. E64380

### ■ Applications

1. Programmable controllers
2. System appliances, measuring instruments
3. Copiers, automatic vending machines
4. Signal transmission between circuits of different potentials and impedances

### ■ Outline Dimensions

(Unit : mm)



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## ■ Absolute Maximum Ratings

(Ta = 25 °C)

| Parameter               |                             | Symbol            | Rating        | Unit             |
|-------------------------|-----------------------------|-------------------|---------------|------------------|
| Input                   | Forward current             | I <sub>F</sub>    | 50            | mA               |
|                         | *1Peak forward current      | I <sub>FM</sub>   | 1             | A                |
|                         | Reverse voltage             | V <sub>R</sub>    | 6             | V                |
|                         | Power dissipation           | P                 | 70            | mW               |
| Output                  | Collector-emitter voltage   | V <sub>CEO</sub>  | 70            | V                |
|                         | Emitter-collector voltage   | V <sub>ECCO</sub> | 0.1           | V                |
|                         | Collector current           | I <sub>C</sub>    | 80            | mA               |
|                         | Collector power dissipation | P <sub>C</sub>    | 150           | mW               |
| Total power dissipation |                             | P <sub>tot</sub>  | 200           | mW               |
| *2Isolation voltage     |                             | V <sub>iso</sub>  | 5 000         | V <sub>rms</sub> |
| Operating temperature   |                             | T <sub>opr</sub>  | - 30 to + 100 | °C               |
| Storage temperature     |                             | T <sub>stg</sub>  | - 55 to + 125 | °C               |
| *3Soldering temperature |                             | T <sub>sol</sub>  | 260           | °C               |

\*1 Pulse width ≤ 100 μs, Duty ratio : 0.001

\*2 40 to 60 % RH, AC for 1 minute

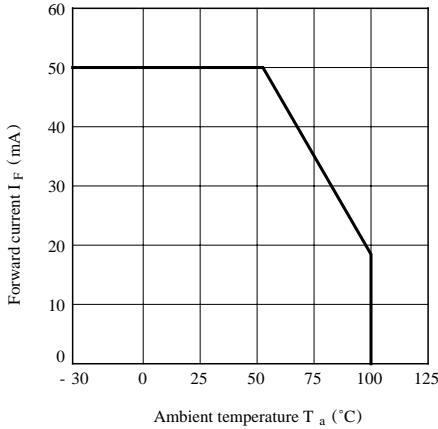
\*3 For 10 seconds

## ■ Electro-optical Characteristics

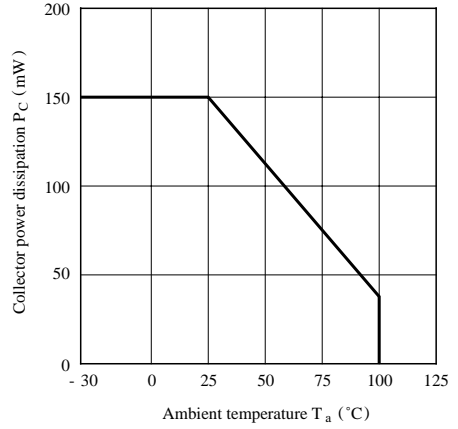
(Ta = 25 °C)

| Parameter                |                                      | Symbol               | Conditions  | MIN.  | TYP.             | MAX.  | Unit                 |    |
|--------------------------|--------------------------------------|----------------------|---|---|------------------|-------|----------------------|----|
| Input                    | Forward voltage                      | V <sub>F</sub>       | I <sub>F</sub> = 20mA   | -   | 1.2              | 1.4   | V                    |    |
|                          | Reverse current                      | I <sub>R</sub>       | V <sub>R</sub> = 4V   | -   | -                | 10    | μA                   |    |
|                          | Terminal capacitance                 | C <sub>t</sub>       | V = 0, f = 1kHz   | -   | 30               | 250   | pF                   |    |
| Output                   | Collector dark current               | I <sub>CEO</sub>     | V <sub>CE</sub> = 24V<br>I <sub>F</sub> = 0                               | Ta = 25 °C  | -                | -     | 2 x 10 <sup>-7</sup> | A  |
|                          |                                      |                      |   | Ta = 85 °C  | -                | -     | 10 <sup>-5</sup>     | A  |
| Transfer characteristics | Current transfer ratio               | CTR                  | I <sub>F</sub> = 1mA, V <sub>CE</sub> = 2V                                | 1 000   | -                | 8 000 | %                    |    |
|                          | Collector-emitter saturation voltage | V <sub>CE(sat)</sub> | I <sub>F</sub> = 20mA, I <sub>C</sub> = 5mA                               | -   | 0.8              | 1.0   | V                    |    |
|                          | Isolation resistance                 | R <sub>iso</sub>     | DC500V, 40 to 60 % RH   | 5 x 10 <sup>10</sup>  | 10 <sup>11</sup> | -     | Ω                    |    |
|                          | Floating capacitance                 | C <sub>f</sub>       | V = 0, f = 1MHz   | -   | 0.6              | 1.0   | pF                   |    |
|                          | Cut-off frequency                    | f <sub>c</sub>       | V <sub>CE</sub> = 2V, I <sub>C</sub> = 2mA, R <sub>L</sub> = 100 Ω, - 3dB | 1   | 6                | -     | kHz                  |    |
|                          | Response time                        | Rise time            | t <sub>r</sub>  | V <sub>CE</sub> = 2V, I <sub>C</sub> = 10mA<br>R <sub>L</sub> = 100 Ω | -                | 100   | 300                  | μs |
| Fall time                |                                      | t <sub>f</sub>       | -   |   | 35               | 200   | μs                   |    |

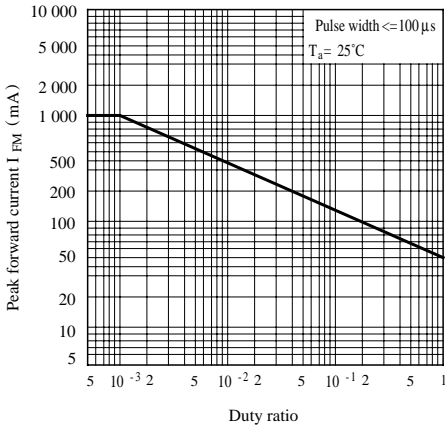
**Fig. 1 Forward Current vs. Ambient Temperature**



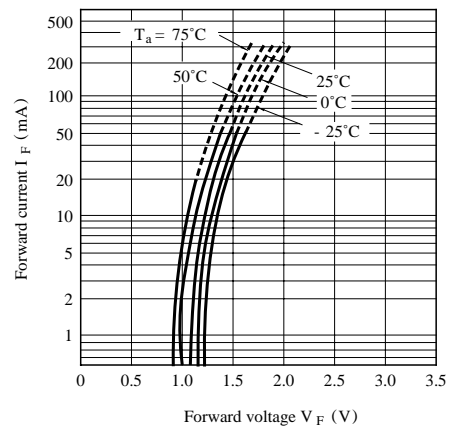
**Fig. 2 Collector Power Dissipation vs. Ambient Temperature**



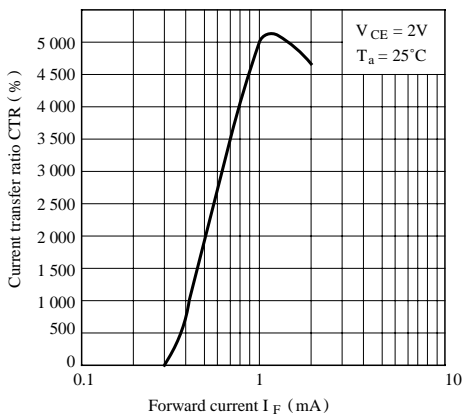
**Fig. 3 Peak Forward Current vs. Duty Ratio**



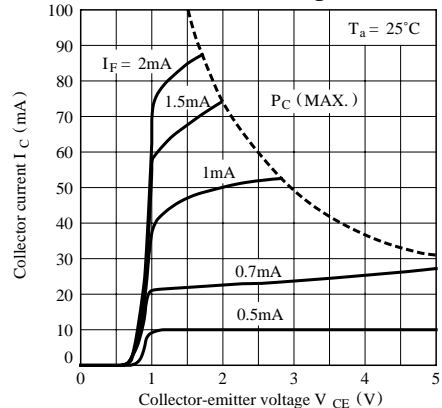
**Fig. 4 Forward Current vs. Forward Voltage**



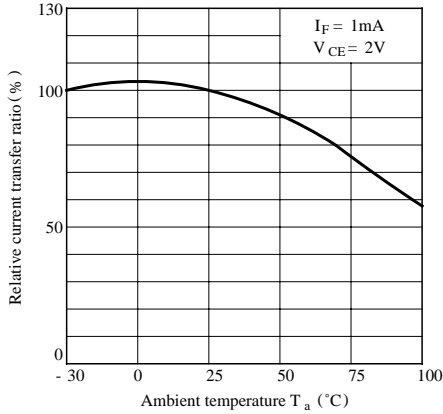
**Fig. 5 Current Transfer Ratio vs. Forward Current**



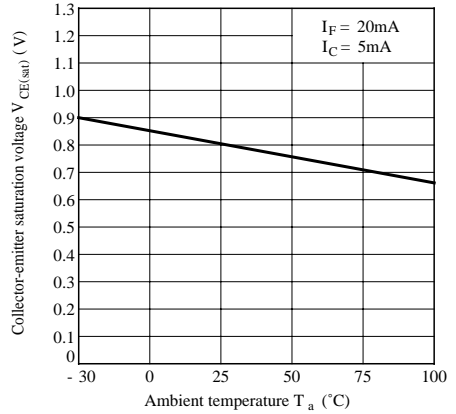
**Fig. 6 Collector Current vs. Collector-emitter Voltage**



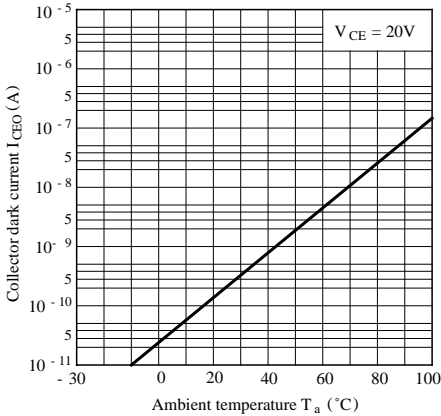
**Fig. 7 Relative Current Transfer Ratio vs. Ambient Temperature**



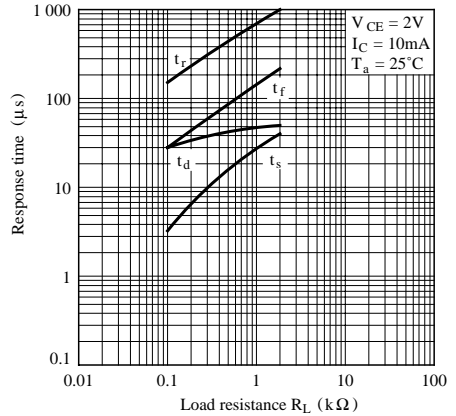
**Fig. 8 Collector-emitter Saturation Voltage vs. Ambient Temperature**



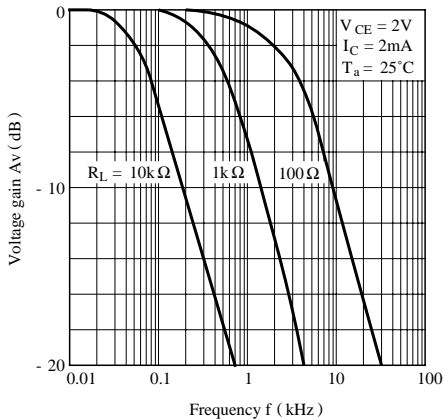
**Fig. 9 Collector Dark Current vs. Ambient Temperature**



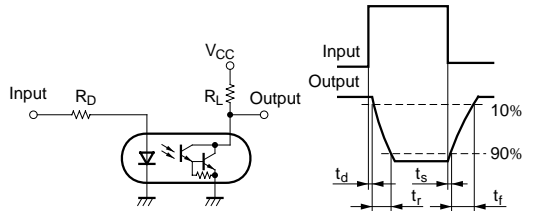
**Fig.10 Response Time vs. Load Resistance**



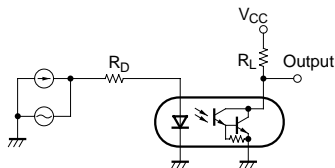
**Fig.11 Frequency Response**



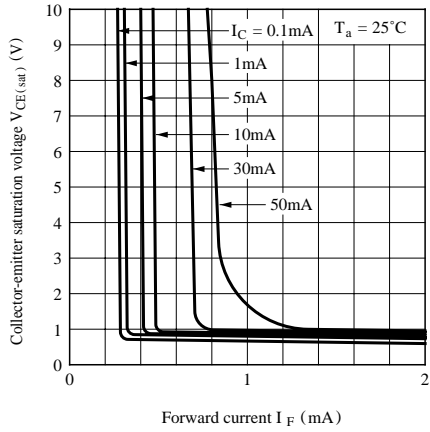
**Test Circuit for Response Time**



**Test Circuit for Frequency Response**



**Fig.12 Collector-emitter Saturation Voltage vs. Forward Current**



- Please refer to the chapter “Precautions for Use”

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    - Traffic signals
    - Gas leakage sensor breakers
    - Alarm equipment
    - Various safety devices, etc.
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