

# PC810

## High Speed Under High Load Resistance Photocoupler

※ Lead forming type (I type) and taping reel type (P type) are also available. (PC810I/PC810P)

### ■ Features

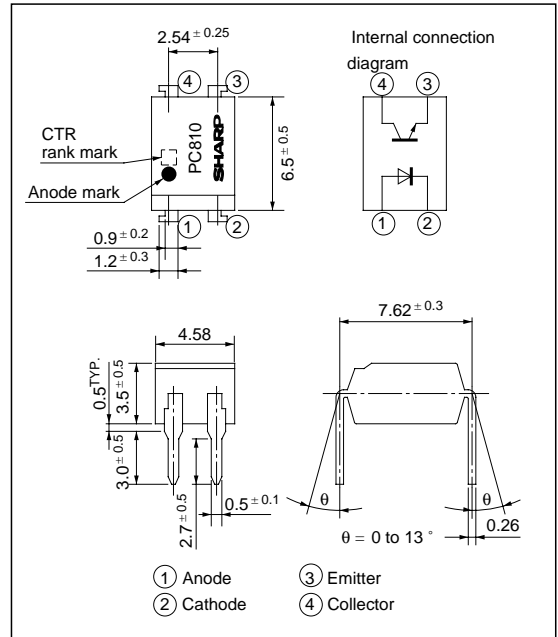
- High speed response under high resistance load  
( $t_{off}$  : MAX. 1ms at  $I_F = 1\text{mA}$ ,  $V_{CC} = 5\text{V}$ ,  $R_L = 110\text{k}\Omega$ )
- High current transfer ratio under low input current  
(CTR : MIN. 60% at  $I_F = 1\text{mA}$ ,  $V_{CE} = 0.4\text{V}$ )
- High isolation voltage between input and output  
( $V_{iso}$  : 5 000V<sub>rms</sub>)
- Compact dual-in-line package
- Recognized by UL, file No. E64380

### ■ Applications

- Solid state relays
- Motor-control equipment
- Signal transmission between circuits of different potentials and impedances

### ■ Outline Dimensions

(Unit : mm)



### ■ Absolute Maximum Ratings

( $T_a = 25^\circ\text{C}$ )

|                          | Parameter                   | Symbol    | Rating        | Unit             |
|--------------------------|-----------------------------|-----------|---------------|------------------|
| Input                    | Forward current             | $I_F$     | 50            | mA               |
|                          | *1 Peak forward current     | $I_{FM}$  | 1             | A                |
|                          | Reverse voltage             | $V_R$     | 6             | V                |
|                          | Power dissipation           | $P$       | 70            | mW               |
| Output                   | Collector-emitter voltage   | $V_{CEO}$ | 35            | V                |
|                          | Emitter-collector voltage   | $V_{ECO}$ | 6             | V                |
|                          | Collector current           | $I_C$     | 50            | mA               |
|                          | Collector power dissipation | $P_C$     | 150           | mW               |
| Total power dissipation  |                             | $P_{tot}$ | 200           | mW               |
| *2 Isolation voltage     |                             | $V_{iso}$ | 5 000         | V <sub>rms</sub> |
| Operating temperature    |                             | $T_{opr}$ | - 30 to + 100 | $^\circ\text{C}$ |
| Storage temperature      |                             | $T_{stg}$ | - 55 to + 125 | $^\circ\text{C}$ |
| *3 Soldering temperature |                             | $T_{sol}$ | 260           | $^\circ\text{C}$ |

\*1 Pulse width  $\leq 100\mu\text{s}$ , Duty ratio : 0.001

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

\*3 For 10 seconds

**■ Electro-optical Characteristics**

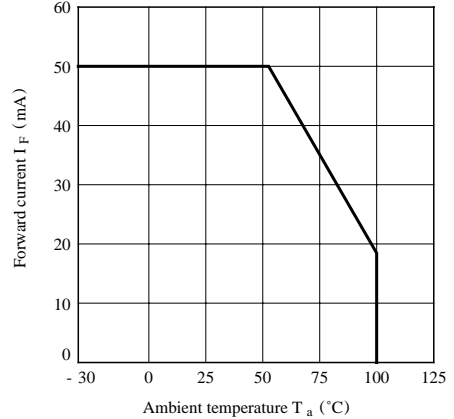
(T<sub>a</sub> = 25°C)

| Parameter                |                                      | Symbol               | Conditions   | MIN.   | TYP.             | MAX.             | Unit |    |
|--------------------------|--------------------------------------|----------------------|--|--|------------------|------------------|------|----|
| Input                    | Forward voltage                      | V <sub>F</sub>       | I <sub>F</sub> = 20mA  | -  | 1.2              | 1.4              | V    |    |
|                          | Peak forward voltage                 | V <sub>FM</sub>      | I <sub>FM</sub> = 0.5A   | -  | -                | 3.0              | 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> = 20V, I <sub>F</sub> = 0                              | -  | -                | 10 <sup>-7</sup> | A    |    |
| Transfer characteristics | *5Current transfer ratio             | CTR                  | I <sub>F</sub> = 1mA, V <sub>CE</sub> = 0.4V                           | 60   | -                | 200              | %    |    |
|                          | Collector-emitter saturation voltage | V <sub>CE(sat)</sub> | I <sub>F</sub> = 20mA, I <sub>C</sub> = 1mA                            | -  | 0.1              | 0.2              | 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> = 5V, I <sub>C</sub> = 2mA, R <sub>L</sub> = 1kΩ, -3dB | 6  | 60               | -                | kHz  |    |
|                          | *5 Response time                     | Rise time            | t <sub>r</sub>   | V <sub>CE</sub> = 2V, I <sub>C</sub> = 2mA, R <sub>L</sub> = 1kΩ | -                | 10               | 50   | μs |
|                          |                                      | Fall time            | t <sub>f</sub>   |  | -                | 10               | 50   | μs |
| *5Turn-off time          |                                      | t <sub>off</sub>     | V <sub>CC</sub> = 5V, I <sub>F</sub> = 1mA, R <sub>L</sub> = 110kΩ     | -  | 0.5              | 1.0              | ms   |    |

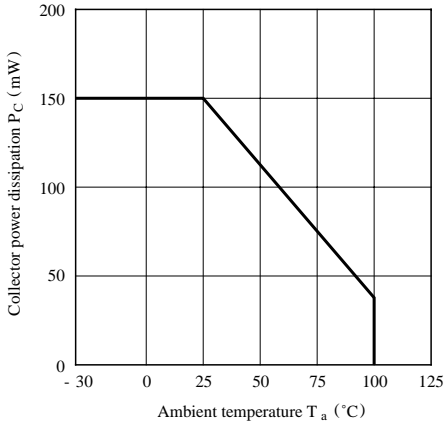
\*5 Classification table of current transfer ratio and response time is shown below

| Model No.              | Rank mark             | CTR (%)   | t <sub>r</sub> (μs)   |      | t <sub>f</sub> (μs) |   | t <sub>off</sub> (μs) |      |
|------------------------|-----------------------|---|---|------|---------------------|---|-----------------------|------|
|                        |                       |   | TYP.  | MAX. | TYP.                | MAX.  | TYP.                  | MAX. |
| PC810A                 | A                     | 60 to 120   | 4   | 15   | 3                   | 15  | 350                   | 500  |
| PC810B                 | B                     | 100 to 200  | 10  | 50   | 10                  | 50  | 500                   | 1000 |
| PC810                  | A or B, or no marking | 60 to 200   | -   | 50   | -                   | 50  | -                     | 1000 |
| Measurement conditions |                       | I <sub>F</sub> = 1mA<br>V <sub>CE</sub> = 0.4V<br>T <sub>a</sub> = 25°C | V <sub>CE</sub> = 2V<br>I <sub>C</sub> = 2mA<br>R <sub>L</sub> = 1kΩ<br>T <sub>a</sub> = 25°C |      |                     | I <sub>F</sub> = 1mA<br>V <sub>CC</sub> = 5V<br>R <sub>L</sub> = 110kΩ<br>T <sub>a</sub> = 25°C |                       |      |

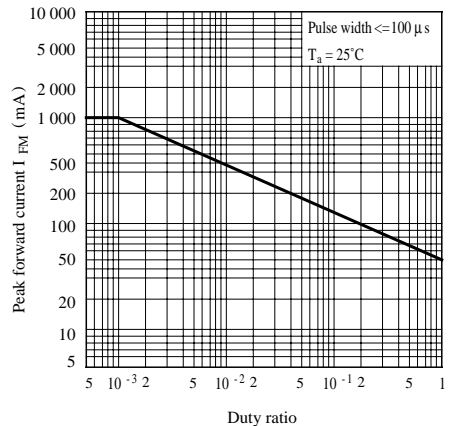
**Fig. 1 Forward Current vs. Ambient Temperature**



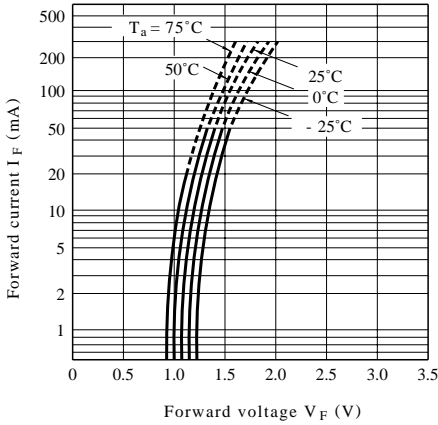
**Fig. 2 Collector Power Dissipation vs. Ambient Temperature**



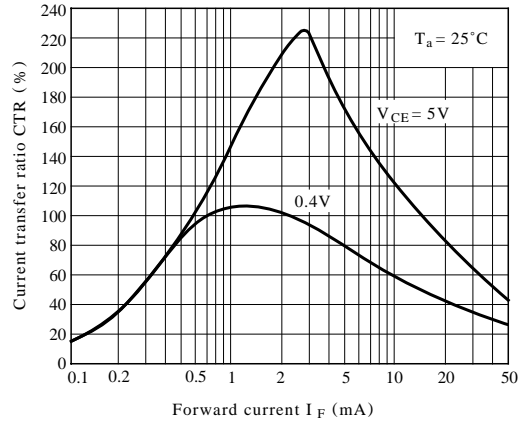
**Fig. 3 Peak Forward Current vs. Duty Ratio**



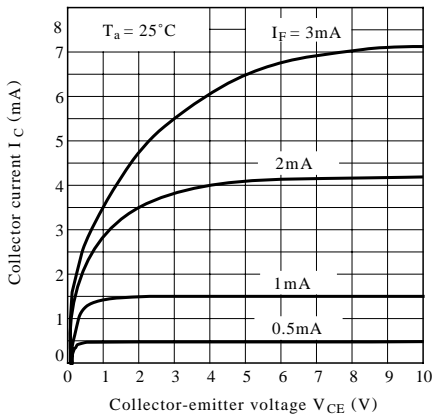
**Fig. 4 Forward Current vs. Forward Voltage**



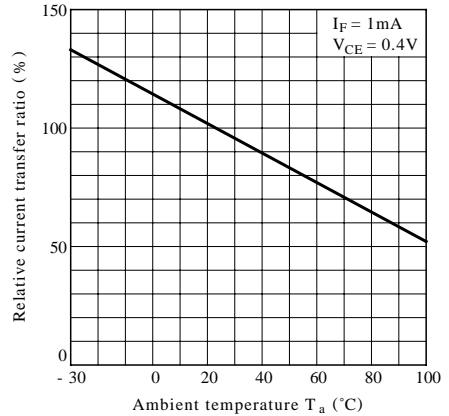
**Fig. 5 Current Transfer Ratio vs. Forward Current**



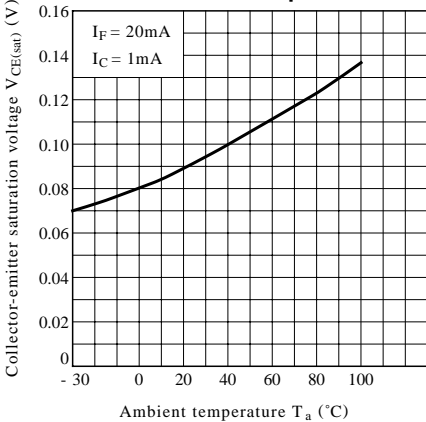
**Fig. 6 Collector Current vs. Collector-emitter Voltage**



**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**

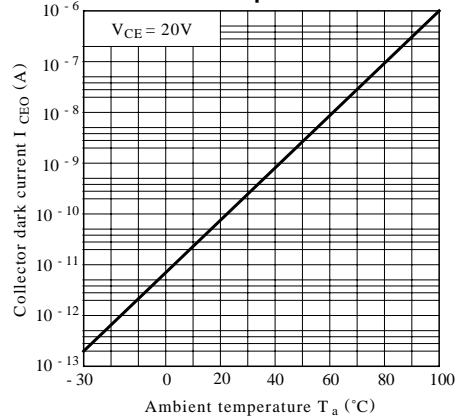


Fig.10 Response Time vs. Load Resistance

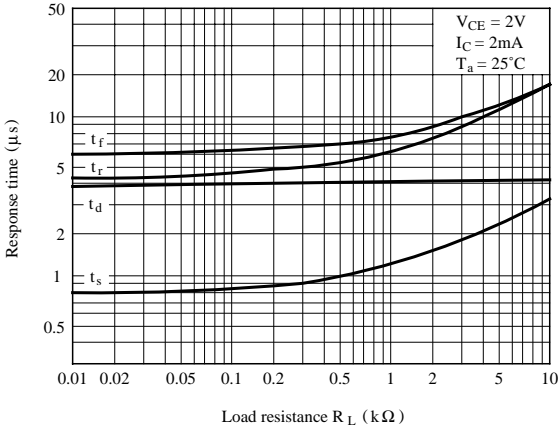


Fig.11 Turn-off Time vs. Load Resistance

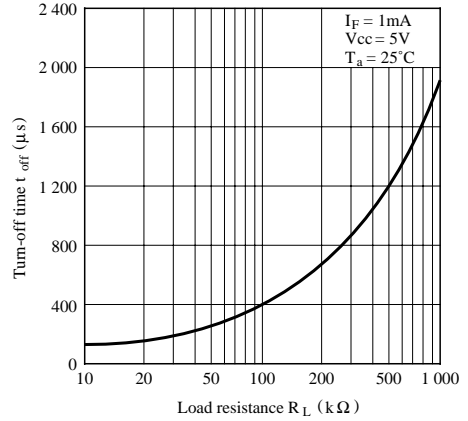


Fig.12 Turn-off Time vs. Ambient Temperature

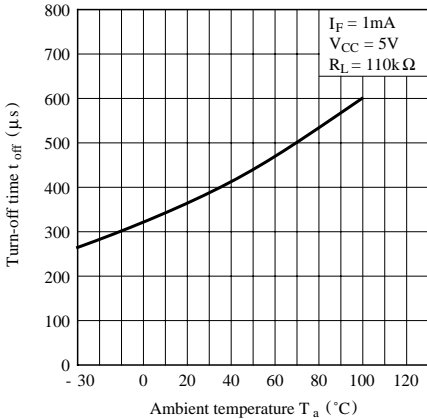
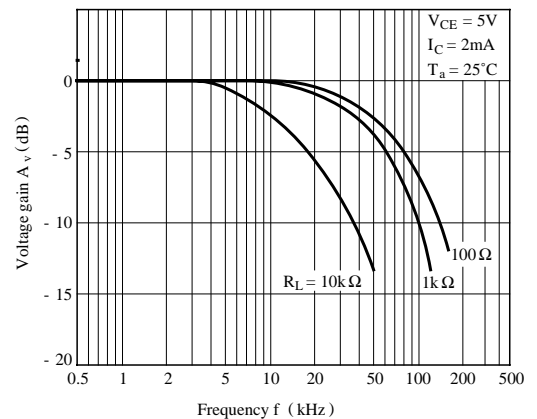
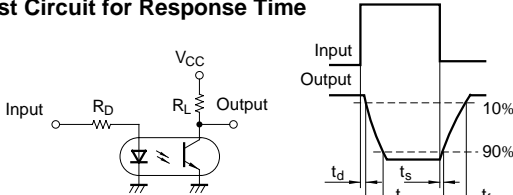


Fig.13 Frequency Response



Test Circuit for Response Time



Test Circuit for Frequency Response

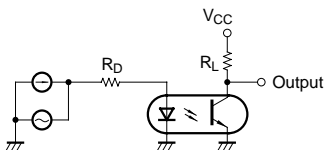


Fig.14 Collector-emitter Saturation Voltage vs. Forward Current

