

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

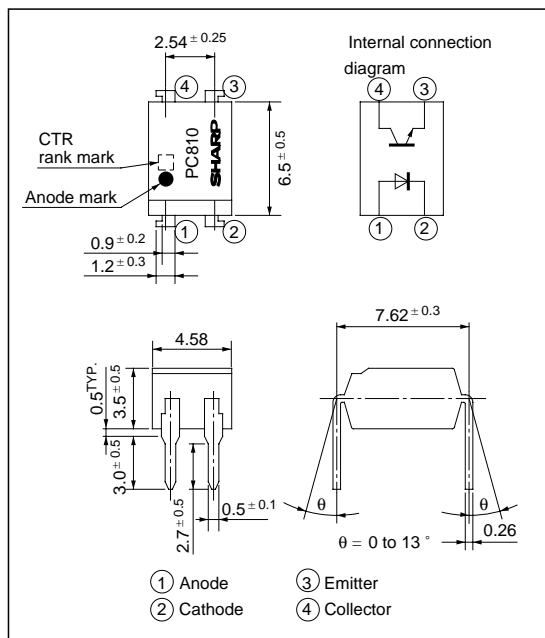
1. High speed response under high resistance load
(t_{off} : MAX. 1ms at $I_F = 1\text{mA}$, $V_{CC} = 5\text{V}$, $R_L = 110\text{k}\Omega$)
2. High current transfer ratio under low input current
(CTR : MIN. 60% at $I_F = 1\text{mA}$, $V_{CE} = 0.4\text{V}$)
3. High isolation voltage between input and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

■ Applications

1. Solid state relays
2. Motor-control equipment
3. 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 _{rms} |
| | Operating temperature | T_{opr} | - 30 to + 100 | °C |
| | Storage temperature | T_{stg} | - 55 to + 125 | °C |
| | *3 Soldering temperature | T_{sol} | 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 _F | I _F = 20mA | - | 1.2 | 1.4 | V |
| | Peak forward voltage | V _{FM} | I _{FM} = 0.5A | - | - | 3.0 | V |
| | Reverse current | I _R | V _R = 4V | - | - | 10 | μA |
| | Terminal capacitance | C _t | V = 0, f = 1kHz | - | 30 | 250 | pF |
| Output | Collector dark current | I _{CEO} | V _{CE} = 20V, I _F = 0 | - | - | 10 ⁻⁷ | A |
| Transfer characteristics | *5Current transfer ratio | CTR | I _F = 1mA, V _{CE} = 0.4V | 60 | - | 200 | % |
| | Collector-emitter saturation voltage | V _{CE(sat)} | I _F = 20mA, I _C = 1mA | - | 0.1 | 0.2 | V |
| | Isolation resistance | R _{ISO} | DC500V, 40 to 60% RH | 5 x 10 ¹⁰ | 10 ¹¹ | - | Ω |
| | Floating capacitance | C _f | V = 0, f = 1MHz | - | 0.6 | 1.0 | pF |
| | Cut-off frequency | f _c | V _{CE} = 5V, I _C = 2mA, R _L = 1kΩ, - 3dB | 6 | 60 | - | kHz |
| | *5 Response time | Rise time | V _{CE} = 2V, I _C = 2mA, R _L = 1kΩ | - | 10 | 50 | μs |
| | | Fall time | | - | 10 | 50 | μs |
| | *5Turn-off time | t _{off} | V _{CC} = 5V, I _F = 1mA, R _L = 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 _r (μs) | | t _f (μs) | | t _{off} (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 | 1 000 |
| PC810 | A or B, or no marking | 60 to 200 | - | 50 | - | 50 | - | 1 000 |
| Measurement conditions | | I _F = 1mA V _{CE} = 0.4V T _a = 25°C | V _{CE} = 2V I _C = 2mA R _L = 1kΩ T _a = 25°C | | I _F = 1mA V _{CC} = 5V R _L = 110kΩ T _a = 25°C | | | |

Fig. 1 Forward Current vs. Ambient Temperature

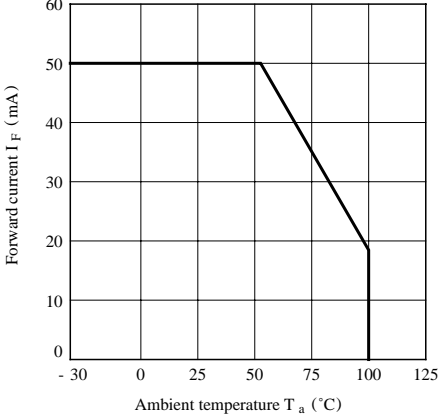


Fig. 2 Collector Power Dissipation vs. Ambient Temperature

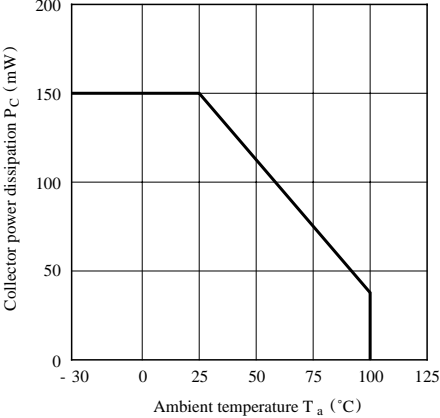


Fig. 3 Peak Forward Current vs. Duty Ratio

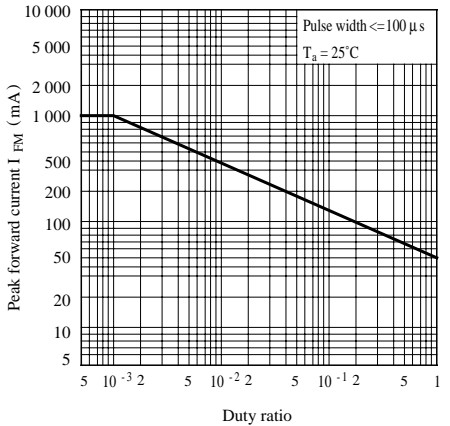


Fig. 4 Forward Current vs. Forward Voltage

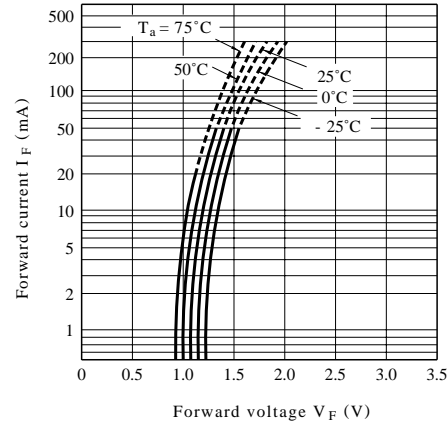


Fig. 5 Current Transfer Ratio vs. Forward Current

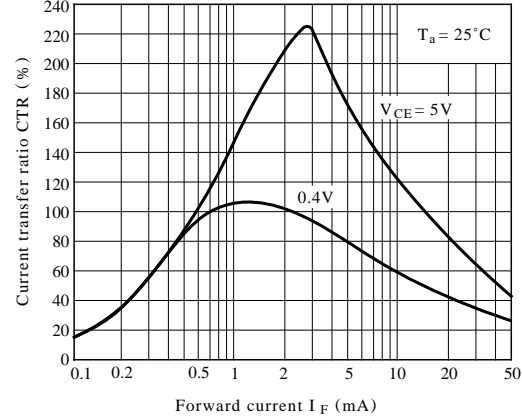


Fig. 6 Collector Current vs. Collector-emitter Voltage

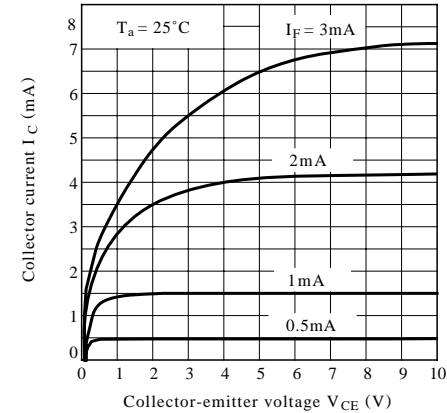


Fig. 7 Relative Current Transfer Ratio vs. Ambient Temperature

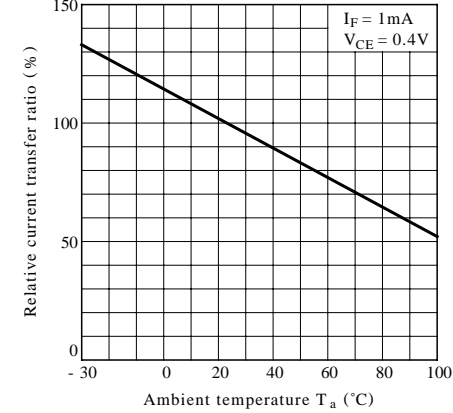


Fig. 8 Collector-emitter Saturation Voltage vs. Ambient Temperature

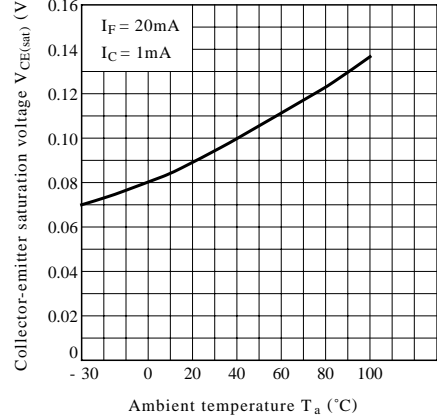


Fig. 9 Collector Dark Current vs. Ambient Temperature

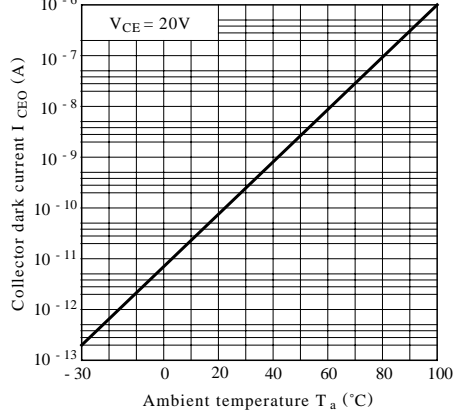


Fig.10 Response Time vs. Load Resistance

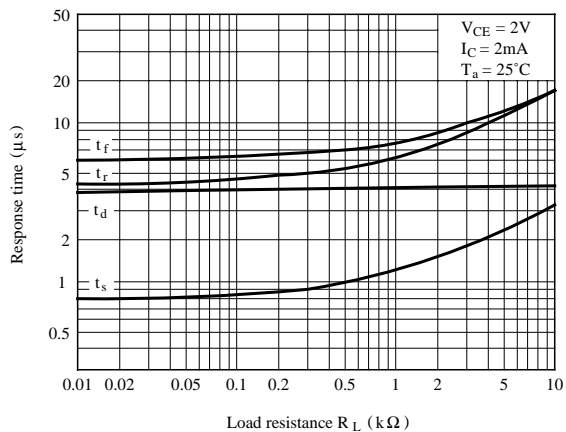


Fig.11 Turn-off Time vs. Load Resistance

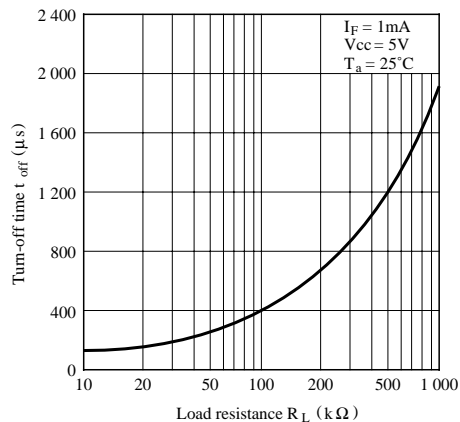


Fig.12 Turn-off Time vs. Ambient Temperature

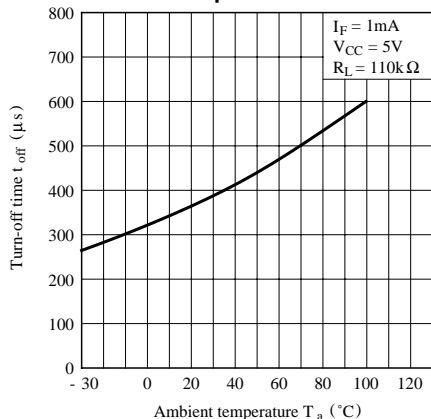
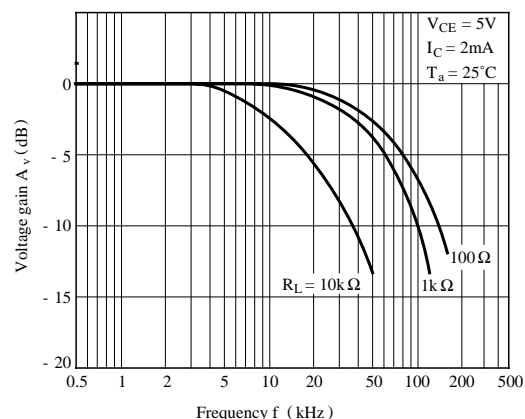
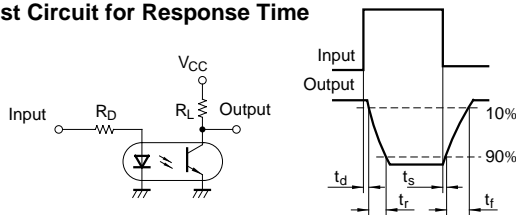


Fig.13 Frequency Response



Test Circuit for Response Time



Test Circuit for Frequency Response

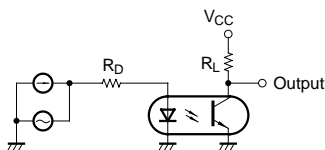


Fig.14 Collector-emitter Saturation Voltage vs. Forward Current

