# PC110L/PC111L PC112L/PC113L

## Long Creepage Distance Type Photocoupler

❋ Lead forming type（I type）and taping reel type（P type）are also available.（**PC110LI / PC111LI / PC112LI / PC113LI , PC110LP0 / PC111LP0 / PC112LP0 / PC113LP0**）

❋ DIN-VDE0884 approved type is also available as an option.

## ■ Features

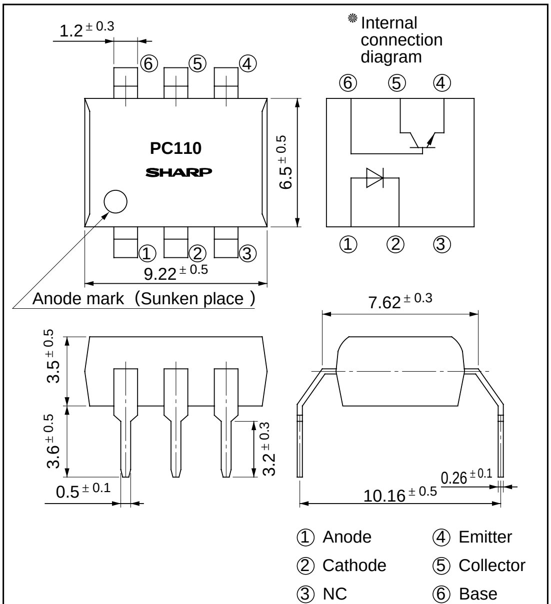
1. Long creepage distance type（Creepage distance : 8mm or more ）*1
2. Internal insulation distance : 0.5mm or more
3. Recognized by UL(No. E64380)
   Approved by VDE（DIN-VDE0884 : No. 77292）
   Approved by BSI（BS415 : 6690, BS7002 : 7421）
   Approved by SEMKO（**PC110L** : No. 8705118
   **PC111L** : No. 8705119
   **PC112L** : No. 8705120
   **PC113L** : No. 8705121）

   Approved by DEMKO（No. 37150）
4. High collector-emitter voltage
   （$V_{CEO}$ : 70V）: **PC112L/PC113L**
5. High isolation voltage between input and output（$V_{iso}$ : 5 000$V_{rms}$）
6. Dual-in-line package

*1 Allows pin-to-pin distance minus PWB land space to be 8mm or more.

## ■ Outline Dimensions

（Unit : mm）




❋ PC111, PC113 have no base terminals.　（⑥ : NC）

## ■ Applications

1. Switching power supplies
2. Home appliances and OA equipment for export to Europe
3. System appliances, measuring instruments

## ■ Absolute Maximum Ratings

(Ta= 25˚C)

| Parameter | | | Symbol | Rating | Unit |
|---|---|---|---|---|---|
| Input | Forward current | | $I_F$ | 50 | mA |
| | *2Peak forward current | | $I_{FM}$ | 1 | A |
| | Reverse Voltage | | $V_R$ | 6 | V |
| | Power dissipation | | P | 70 | mW |
| Output | Collector-emitter voltage | **PC110L/PC111L** | $V_{CEO}$ | 35 | V |
| | | **PC112L/PC113L** | | 70 | |
| | Emitter-collector voltage | | $V_{ECO}$ | 6 | V |
| | *3Collector-base voltage | **PC110L** | $V_{CBO}$ | 35 | V |
| | | **PC112L** | | 70 | |
| | *3Emitter-base voltage | **PC110L/PC112L** | $V_{EBO}$ | 6 | V |
| | Collector current | | $I_C$ | 50 | mA |
| | Collector power dissipation | **PC110L/PC111L** | $P_C$ | 150 | mW |
| | | **PC112L/PC113L** | | 160 | |
| Total power dissipation | | **PC110L/PC111L** | $P_{tot}$ | 170 | mW |
| | | **PC112L/PC113L** | | 200 | |
| *4Isolation voltage | | | $V_{iso}$ | 5 000 | Vrms |
| Operating temperature | | | $T_{opr}$ | - 30 to + 100 | ˚C |
| Storage temperature | | | $T_{stg}$ | - 55 to + 125 | ˚C |
| *5Soldering temperature | | | $T_{sol}$ | 260 | ˚C |

*2 Pulse width <=100 μs, Duty ratio: 0.001
*3 Applies only to **PC110L, PC112L.**
*4 40 to 60% RH, AC for 1 minute
*5 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 |
| | 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, $R_{BE}$ = ∞ | - | - | $10^{-7}$ | A |
| | Collector-emitter brakedown voltage | | **PC110L/PC111L** | $BV_{CEO}$ | $I_C$ = 0.1mA, $I_F$ = 0 | 35 | - | - | V |
| | | | **PC112L/PC113L** | | | 70 | - | - | |
| | Emitter-collector breakdown voltage | | | $BV_{ECO}$ | $I_E$ = 10μA, $I_F$ = 0 | 6 | - | - | V |
| | Collector-base breakdown voltage | | **PC110L** | $BV_{CBO}$ | $I_C$ = 0.1mA, $I_F$ = 0 | 35 | - | - | V |
| | | | **PC112L** | | | 70 | - | - | |
| Transfer charac-teristics | Current transfer ratio | | **PC110L** | CTR | $I_F$ = 5mA, $V_{CE}$ = 5V, $R_{BE}$ = ∞ | 50 | - | 400 | % |
| | | | **PC111L** | | | 50 | 100 | 400 | |
| | | | **PC112L/PC113L** | | $I_F$ = 10mA, $V_{CE}$ = 5V, $R_{BE}$ = ∞ | 40 | - | 320 | |
| | Collector-emitter saturation voltage | | | $V_{CE(sat)}$ | $I_F$ = 20mA, $I_C$ = 1mA, $R_{BE}$ = ∞ | - | 0.1 | 0.2 | V |
| | Isolation resistance | | | $R_{ISO}$ | DC500V, 40 to 60% RH | $5 \times 10^{10}$ | $1 \times 10^{11}$ | - | Ω |
| | Floating resistance | | | $C_f$ | V = 0, f = 1MHz | - | 0.6 | 1.0 | pF |
| | Cut-off frequency | | | $f_C$ | $V_{CE}$ = 5V, $I_C$ = 2mA, $R_L$ = 100Ω, - 3dB | - | 80 | - | kHz |
| | Response time | Rise time | **PC110L/PC111L** | $t_r$ | $V_{CE}$ = 2V, $I_C$ = 2mA, $R_L$ = 100Ω | - | 4 | 18 | μs |
| | | | **PC112L/PC113L** | | | - | 4 | 15 | |
| | | Fall time | **PC110L/PC111L** | $t_f$ | | - | 3 | 18 | μs |
| | | | **PC112L/PC113L** | | | - | 3 | 15 | |

### PC110L/PC111L

| Model No. | CTR(%) |
|---|---|
| **PC110L1/PC111L1** | 50 to 125 |
| **PC110L2/PC111L2** | 100 to 250 |
| **PC110L5/PC111L5** | 50 to 250 |
| **PC110L/PC111L** | 50 to 400 |

### PC112L/PC113L

| Model No. | CTR(%) |
|---|---|
| **PC112L1/PC113L1** | 40 to 120 |
| **PC112L2/PC113L2** | 80 to 200 |
| **PC112L5/PC113L5** | 40 to 200 |
| **PC112L/PC113L** | 40 to 320 |

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

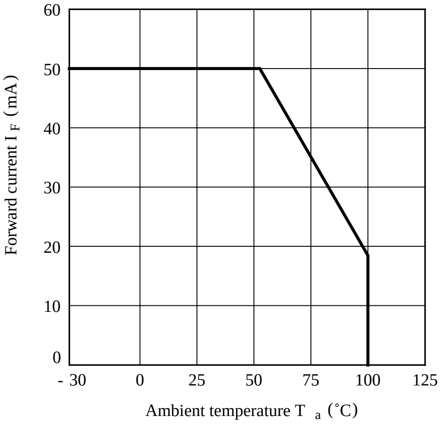



**Fig. 2 Diode Power Dissipation vs. Ambient Temperature**

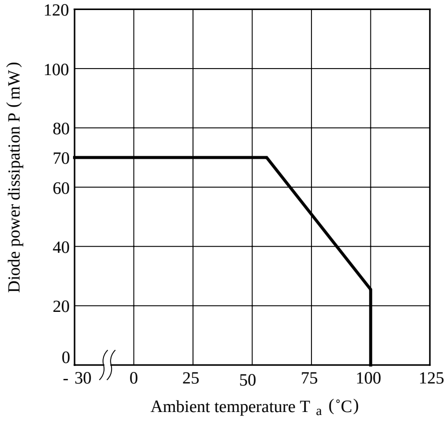



**Fig. 3 Collector Power Dissipation vs. Ambient Temperature**

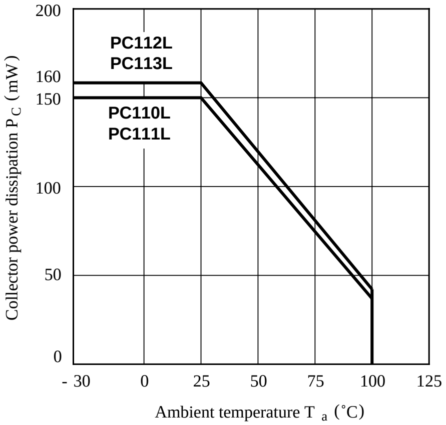



**Fig. 4 Power Dissipation vs. Ambient Temperature**

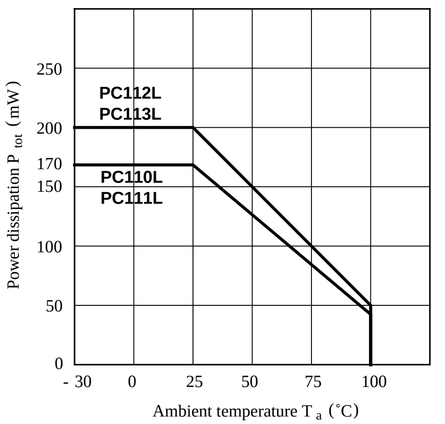



**Fig. 5 Peak Forward Current vs. Duty Ratio**

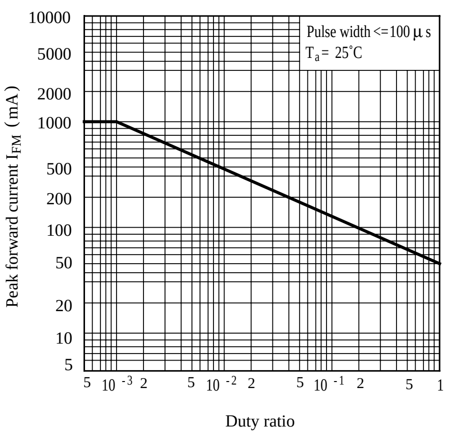



**Fig. 6 Forward Current vs. Forward Voltage**

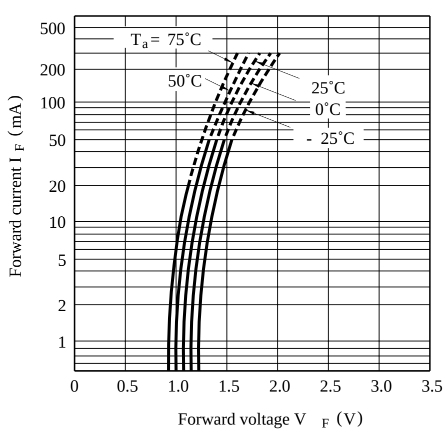


**Fig. 7-a Current Transfer Ratio vs. Forward Current (PC110L, PC111L*) (*Applies only to R BE= ∞ )**

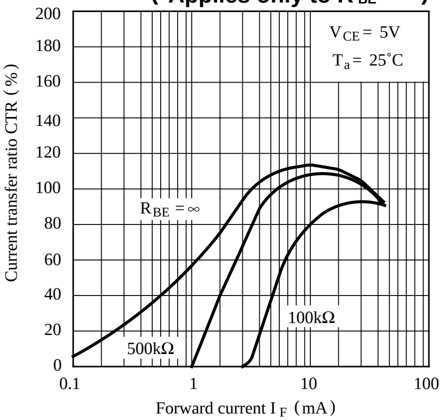



**Fig. 7-b Current Transfer Ratio vs. Forward Current (PC112L, PC113L*) (*Applies only to R BE= ∞ )**

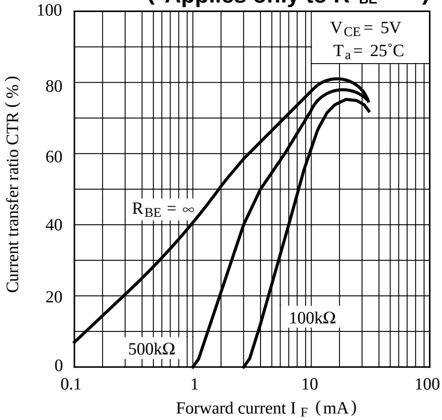



**Fig. 8-a Collector Current vs. Collector-emitter Voltage (PC110L, PC111L)**

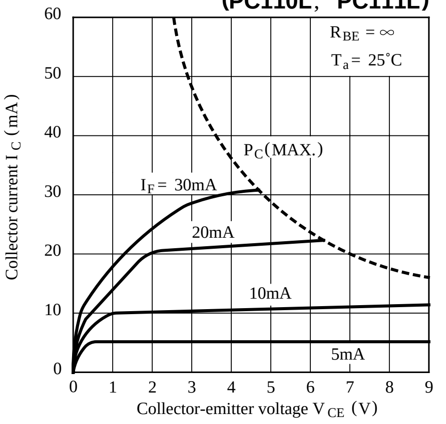



**Fig. 8-b Collector Current vs. Collector-emitter Voltage (PC112L, PC113L)**

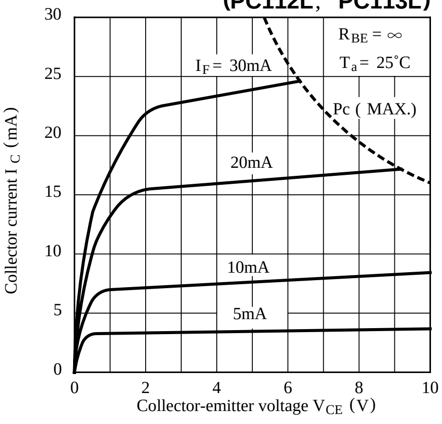



**Fig. 9-a Relative Current Transfer Ratio vs. Ambient Temperature (PC110L, PC111L)**

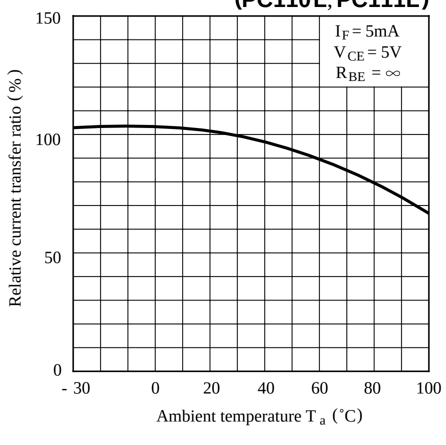



**Fig. 9-b Relative Current Transfer Ratio vs. Ambient Temperature (PC112L, PC113L)**

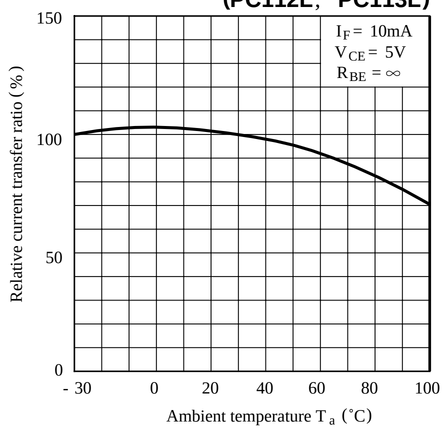


**Fig.10-a Collector-emitter Saturation Voltage vs. Ambient Temperature (PC110L, PC111L)**

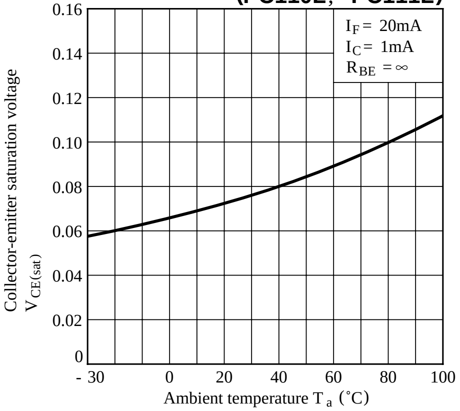



**Fig.10-b Collector-emitter Saturation Voltage vs. Ambient Temperature (PC112L, PC113L)**

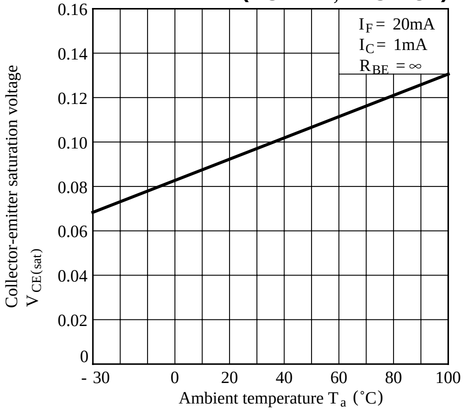



**Fig.11-a Collector Dark Current vs. Ambient Temperature (PC110L, PC111L)**

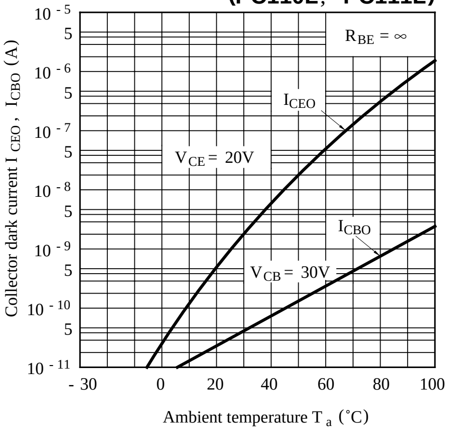



**Fig.11-b Collector Dark Current vs. Ambient Temperature (PC112L, PC113L)**

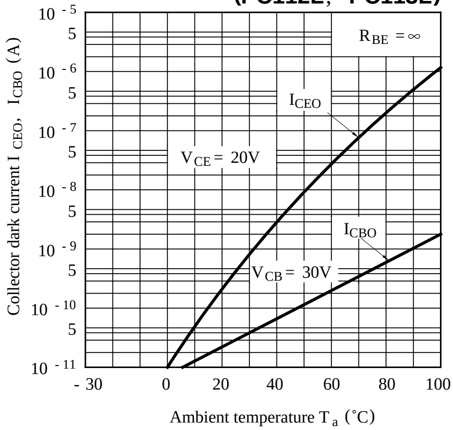



**Fig.12-a Response Time vs. Load Resistance (PC110L, PC111L)**

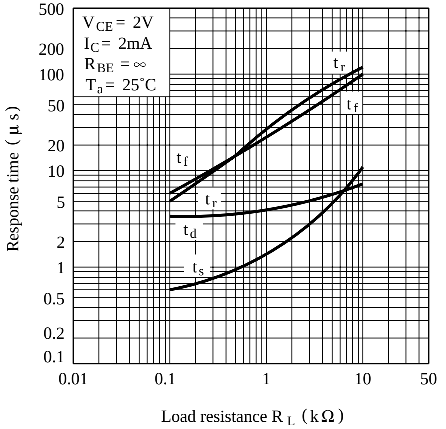
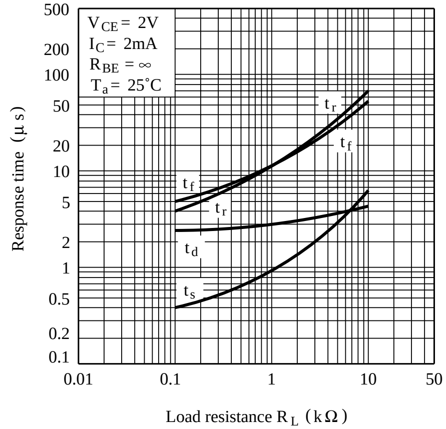
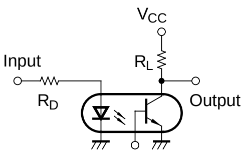
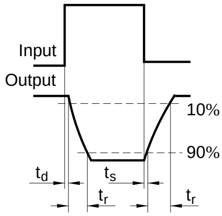



**Fig.12-b Response Time vs. Load Resistance (PC112L, PC113L)**



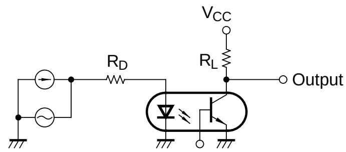
### Test Circuit for Response Time



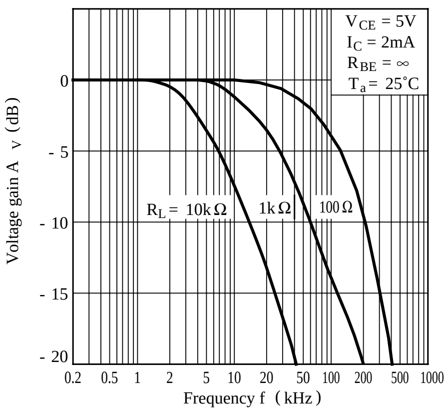

**PC111L** and **PC113L** have no base terminal.

### Test Circuit for Frequency Response

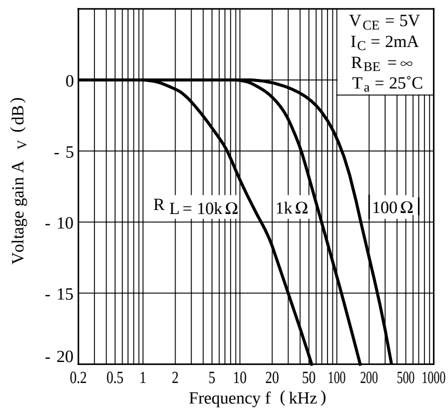



**PC111L** and **PC113L** have no base terminal.

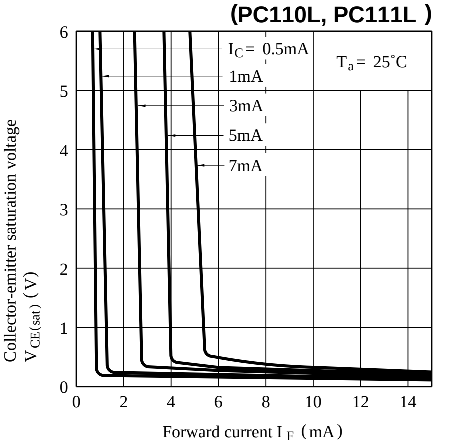
### Fig.13-a Frequency Response (PC110L, PC111L)



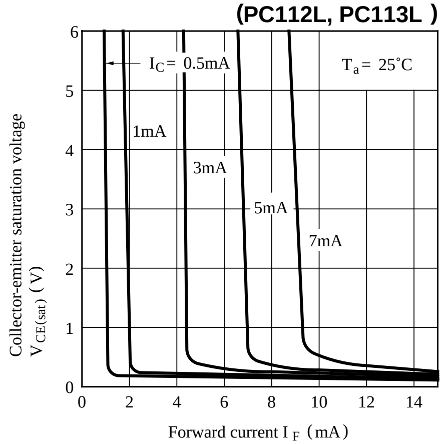

### Fig.13-b Frequency Response (PC112L, PC113L)




### Fig.14-a Collector-emitter Saturation Voltage vs. Forward Current (PC110L, PC111L)




### Fig.14-b Collector-emitter Saturation Voltage vs. Forward Current (PC112L, PC113L)




● Please refer to the chapter "Precautions for Use"