

# 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

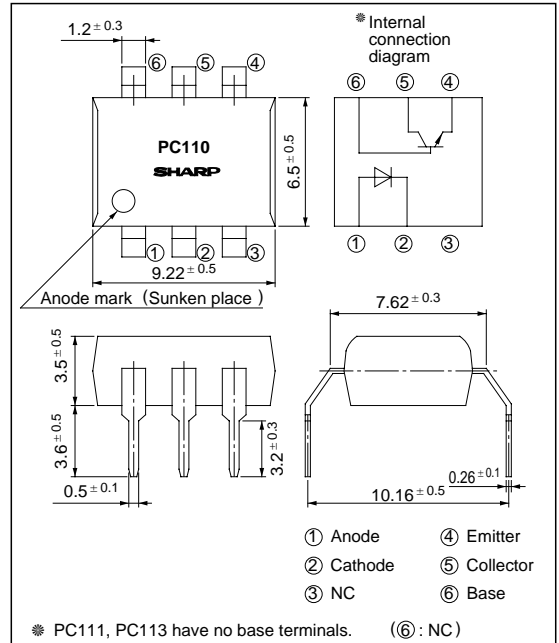
1. Long creepage distance type (Creepage distance : 8mm or more ) \*1
2. Internal insulation distance : 0.5mm or more
3. Recognized by UL(No. E64380)  
Approved by VDE (DIN-VDE0884 : No. 77292 )  
Approved by BSI (BS415 : 6690, BS7002 : 7421)  
Approved by SEMKO ( **PC110L** : No. 8705118  
**PC111L**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

Approved by DEMKO (No. 37150)

4. High collector-emitter voltage  
(  $V_{CE0}$  : 70V ) : **PC112L/PC113L**
  5. High isolation voltage between input and output (  $V_{iso}$  : 5 000V<sub>rms</sub> )
  6. Dual-in-line package
- \*1 Allows pin-to-pin distance minus PWB land space to be 8mm or more.

### ■ Outline Dimensions

(Unit : mm)



### ■ 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	35	V	
		PC112L/PC113L	70		
	Emitter-collector voltage	$V_{ECO}$	6	V	
	*3Collector-base voltage	PC110L	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 <sub>C</sub>	150	mW
PC112L/PC113L		160			
Total power dissipation	PC110L/PC111L	P <sub>tot</sub>	170	mW	
	PC112L/PC113L		200		
*4Isolation voltage		$V_{iso}$	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	
*5Soldering temperature		T <sub>sol</sub>	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	$V_F$	$I_F = 20\text{mA}$	-	1.2	1.4	V	
	Reverse current	$I_R$	$V_R = 4\text{V}$	-	-	10	μA	
	Terminal capacitance	$C_t$	$V = 0, f = 1\text{kHz}$	-	30	250	pF	
Output	Collector dark current	$I_{CEO}$	$V_{CE} = 20\text{V}, I_F = 0, R_{BE} = \infty$	-	-	$10^{-7}$	A	
	Collector-emitter breakdown voltage	PC110L/PC111L	$BV_{CEO}$	$I_C = 0.1\text{mA}, I_F = 0$	35	-	-	V
		PC112L/PC113L			70	-	-	
	Emitter-collector breakdown voltage	$BV_{ECO}$	$I_E = 10\mu\text{A}, I_F = 0$	6	-	-	V	
	Collector-base breakdown voltage	PC110L	$BV_{CBO}$	$I_C = 0.1\text{mA}, I_F = 0$	35	-	-	V
PC112L		70			-	-		
Transfer characteristics	Current transfer ratio	PC110L	CTR	$I_F = 5\text{mA}, V_{CE} = 5\text{V}, R_{BE} = \infty$	50	-	400	%
		PC111L			50	100	400	
		PC112L/PC113L			40	-	320	
	Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_F = 20\text{mA}, I_C = 1\text{mA}, R_{BE} = \infty$	-	0.1	0.2	V	
	Isolation resistance	R <sub>ISO</sub>	DC500V, 40 to 60% RH	$5 \times 10^{10}$	$1 \times 10^{11}$	-	Ω	
	Floating resistance	$C_f$	$V = 0, f = 1\text{MHz}$	-	0.6	1.0	pF	
	Cut-off frequency	$f_c$	$V_{CE} = 5\text{V}, I_C = 2\text{mA}, R_L = 100\Omega, - 3\text{dB}$	-	80	-	kHz	
	Response time	Rise time	PC110L/PC111L	$V_{CE} = 2\text{V}, I_C = 2\text{mA}$ $R_L = 100\Omega$	$t_r$	-	4	18
PC112L/PC113L			-			4	15	
Fall time		PC110L/PC111L	-			3	18	μs
		PC112L/PC113L	-			3	15	

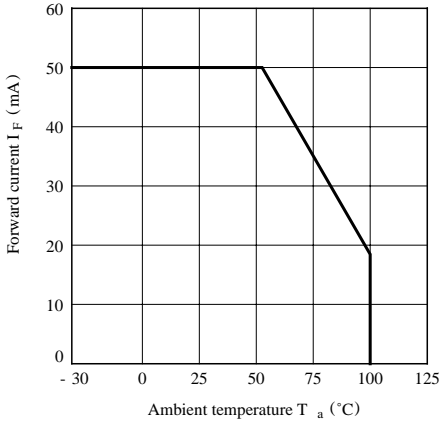
### PC110L/PC111L

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

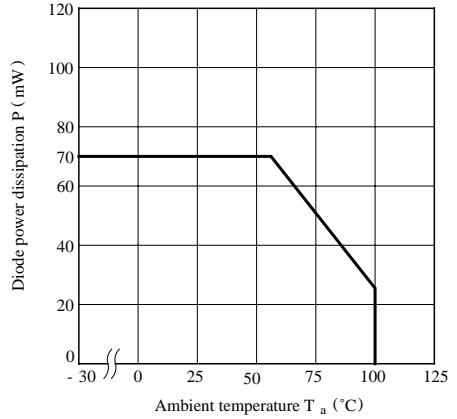
### PC112L/PC113L

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

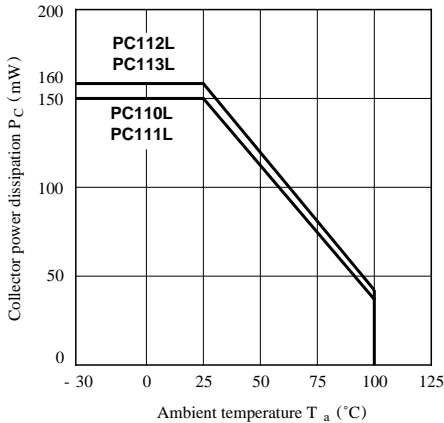
**Fig. 1 Forward Current vs. Ambient Temperature**



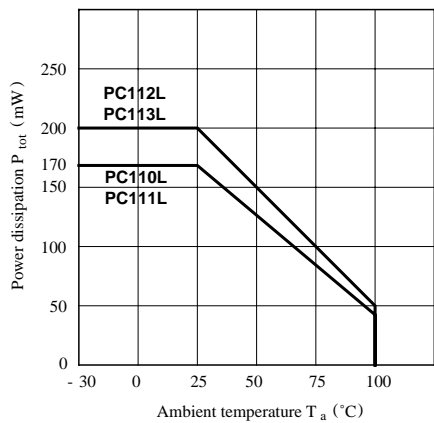
**Fig. 2 Diode Power Dissipation vs. Ambient Temperature**



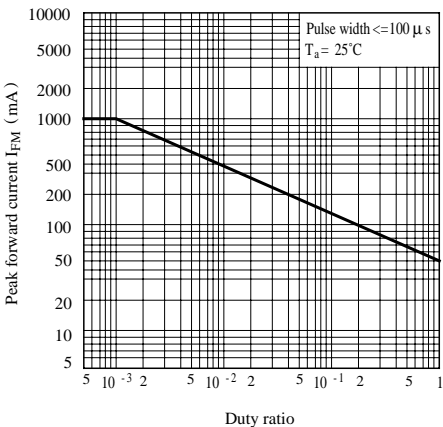
**Fig. 3 Collector Power Dissipation vs. Ambient Temperature**



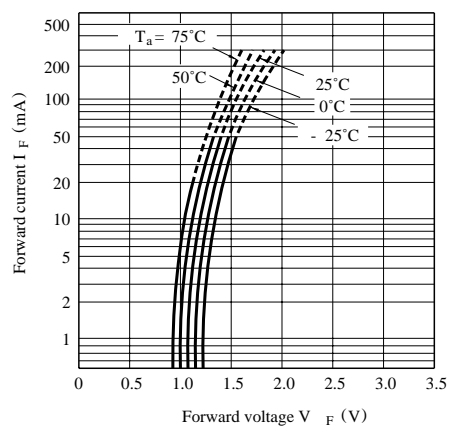
**Fig. 4 Power Dissipation vs. Ambient Temperature**



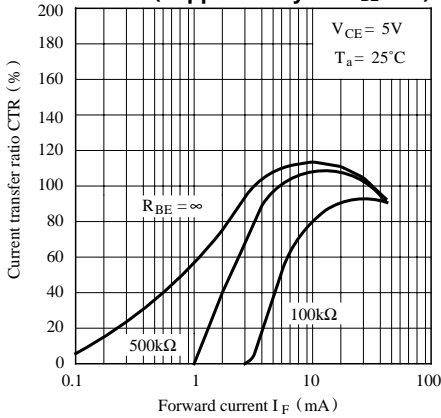
**Fig. 5 Peak Forward Current vs. Duty Ratio**



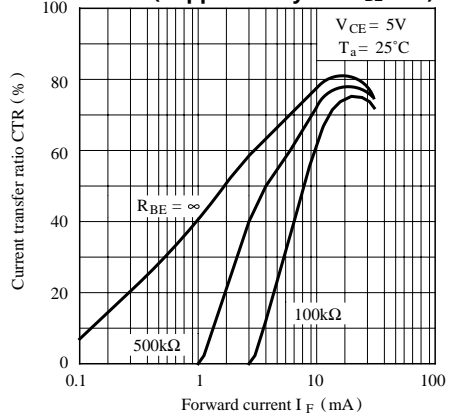
**Fig. 6 Forward Current vs. Forward Voltage**



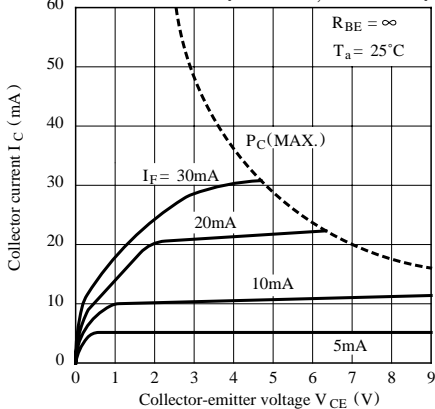
**Fig. 7-a Current Transfer Ratio vs. Forward Current (PC110L, PC111L\*)**  
 (\*Applies only to  $R_{BE} = \infty$ )



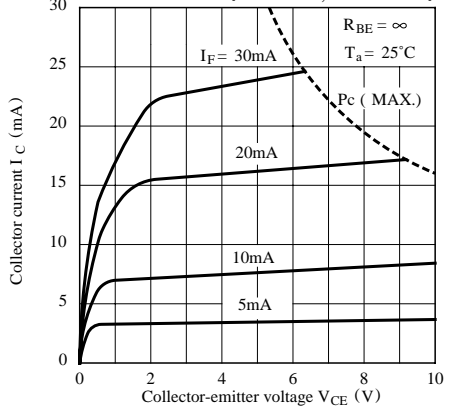
**Fig. 7-b Current Transfer Ratio vs. Forward Current (PC112L, PC113L\*)**  
 (\*Applies only to  $R_{BE} = \infty$ )



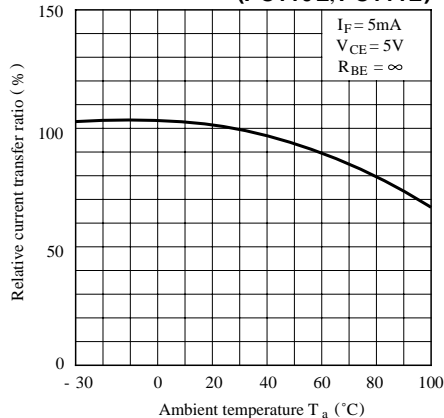
**Fig. 8-a Collector Current vs. Collector-emitter Voltage (PC110L, PC111L)**



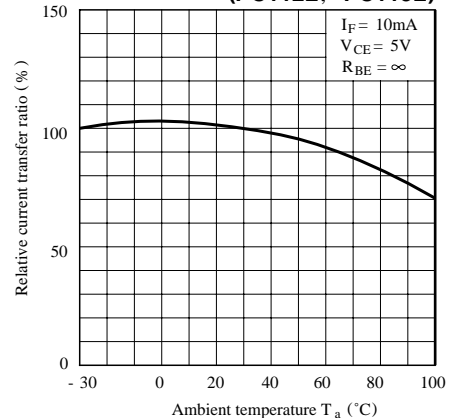
**Fig. 8-b Collector Current vs. Collector-emitter Voltage (PC112L, PC113L)**



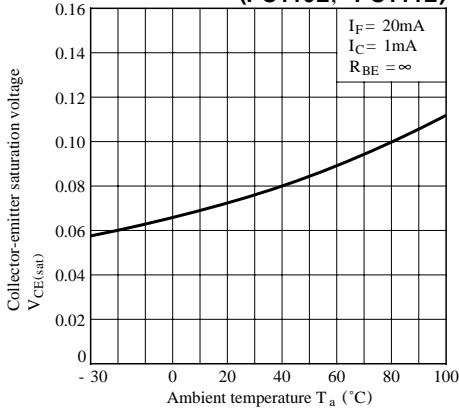
**Fig. 9-a Relative Current Transfer Ratio vs. Ambient Temperature (PC110L, PC111L)**



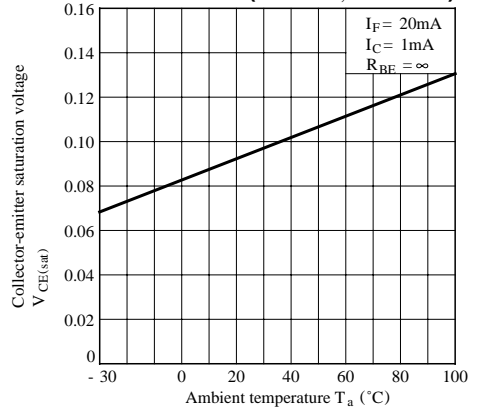
**Fig. 9-b Relative Current Transfer Ratio vs. Ambient Temperature (PC112L, PC113L)**



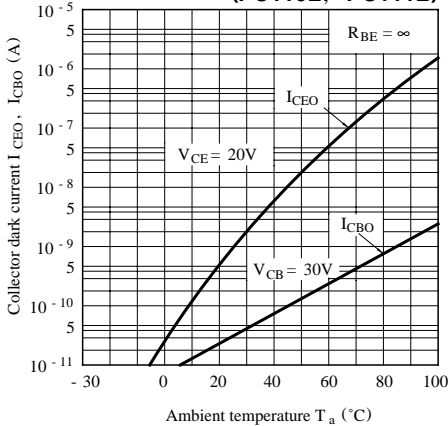
**Fig.10-a Collector-emitter Saturation Voltage vs. Ambient Temperature (PC110L, PC111L)**



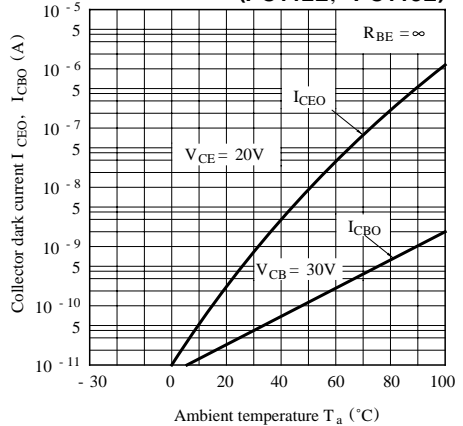
**Fig.10-b Collector-emitter Saturation Voltage vs. Ambient Temperature (PC112L, PC113L)**



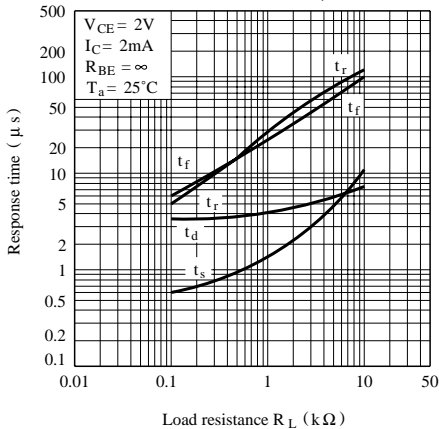
**Fig.11-a Collector Dark Current vs. Ambient Temperature (PC110L, PC111L)**



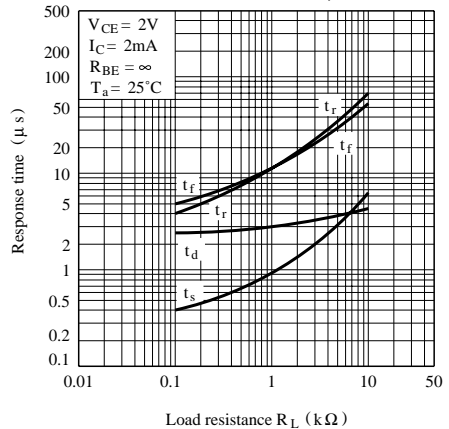
**Fig.11-b Collector Dark Current vs. Ambient Temperature (PC112L, PC113L)**



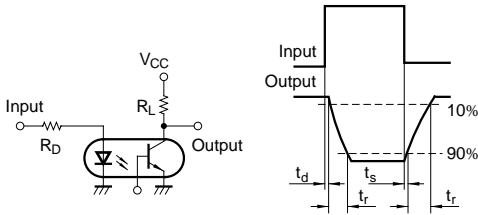
**Fig.12-a Response Time vs. Load Resistance (PC110L, PC111L)**



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

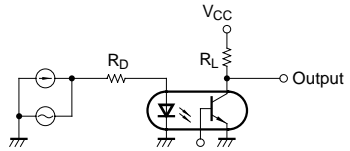


**Test Circuit for Response Time**



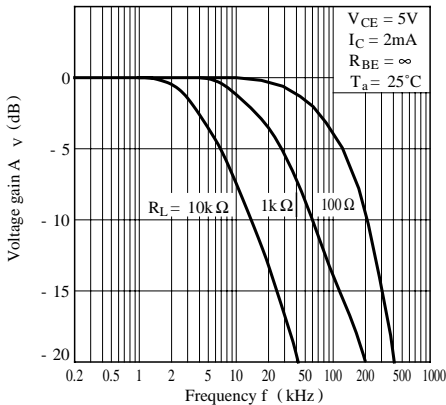
PC111L and PC113L have no base terminal.

**Test Circuit for Frequency Response**

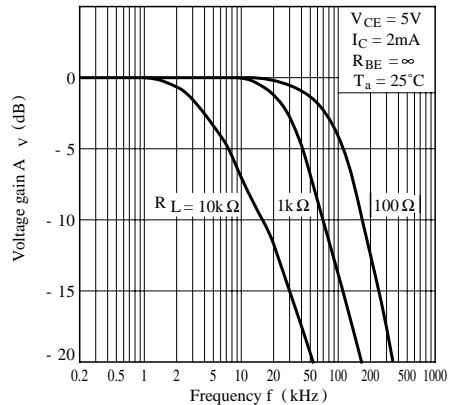


PC111L and PC113L have no base terminal.

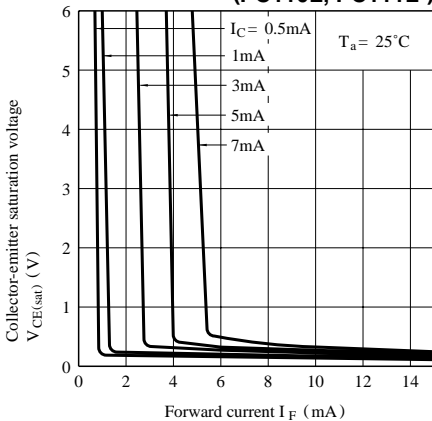
**Fig.13-a Frequency Response (PC110L, PC111L)**



**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)**

