

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

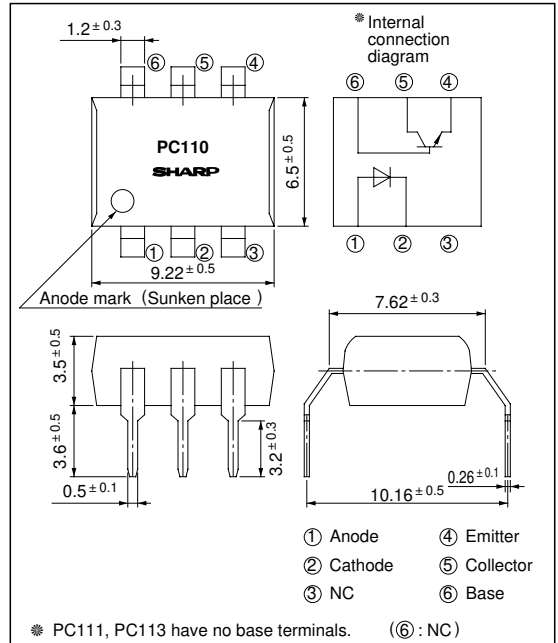
1. Long creepage distance type (Creepage distance : 8mm or more)*1
2. Internal insulation distance : 0.5mm or more
3. Recognized by UL(No. E64380)
Approved by VDE (DIN-VDE0884 : No. 77292)
Approved by BSI (BS415 : 6690, BS7002 : 7421)
Approved by SEMKO (PC110L : No. 8705118
PC111L : No. 8705119
PC112L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



■ 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 _C	150	mW
PC112L/PC113L		160			
Total power dissipation	PC110L/PC111L	P _{tot}	170	mW	
	PC112L/PC113L		200		
*4Isolation voltage		V_{iso}	5 000	V _{rms}	
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	$I_F = 20\text{mA}$	-	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 _{ISO}	DC500V, 40 to 60% RH	5×10^{10}	1×10^{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

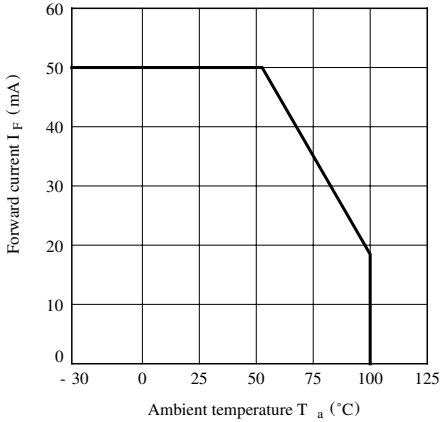


Fig. 2 Diode Power Dissipation vs. Ambient Temperature

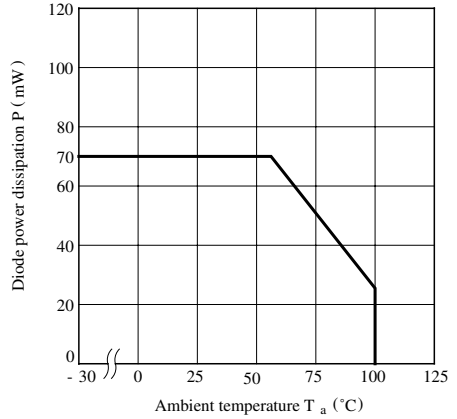


Fig. 3 Collector Power Dissipation vs. Ambient Temperature

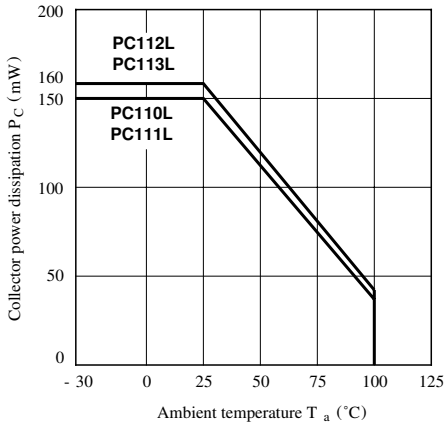


Fig. 4 Power Dissipation vs. Ambient Temperature

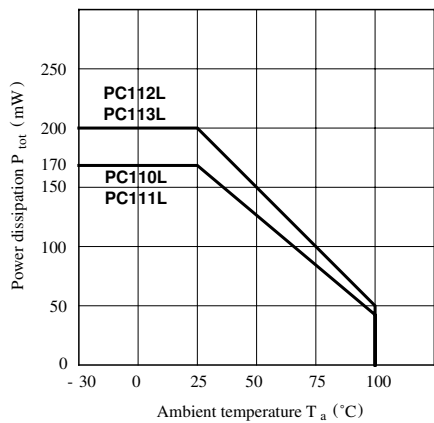


Fig. 5 Peak Forward Current vs. Duty Ratio

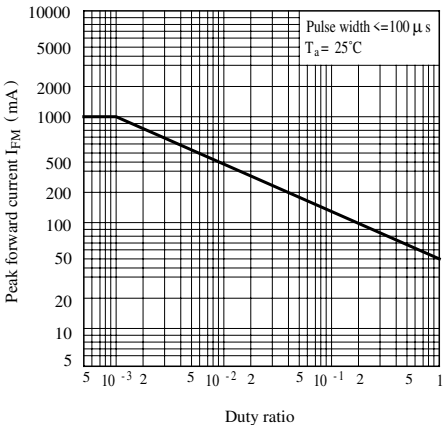


Fig. 6 Forward Current vs. Forward Voltage

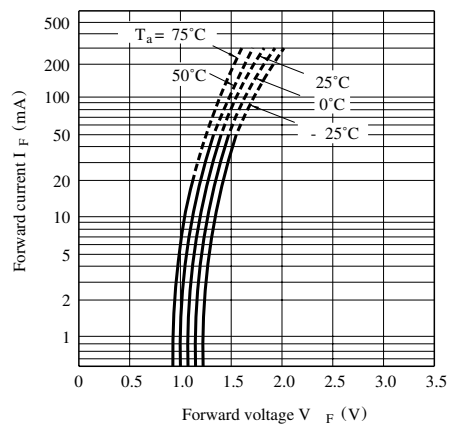


Fig. 7-a Current Transfer Ratio vs. Forward Current (PC110L, PC111L*)
 (*Applies only to $R_{BE} = \infty$)

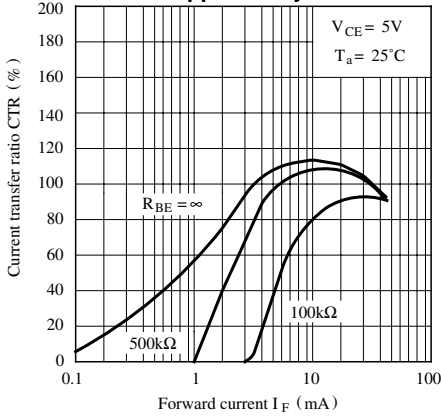


Fig. 7-b Current Transfer Ratio vs. Forward Current (PC112L, PC113L*)
 (*Applies only to $R_{BE} = \infty$)

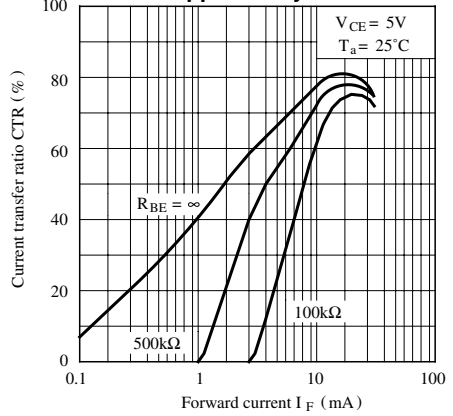


Fig. 8-a Collector Current vs. Collector-emitter Voltage (PC110L, PC111L)

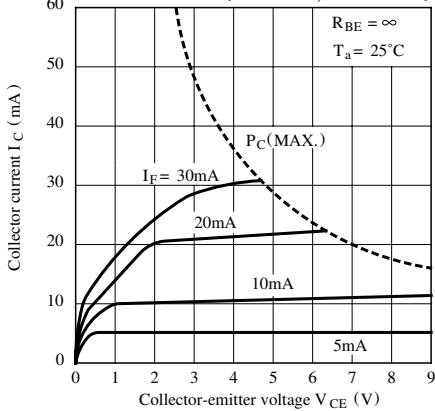


Fig. 8-b Collector Current vs. Collector-emitter Voltage (PC112L, PC113L)

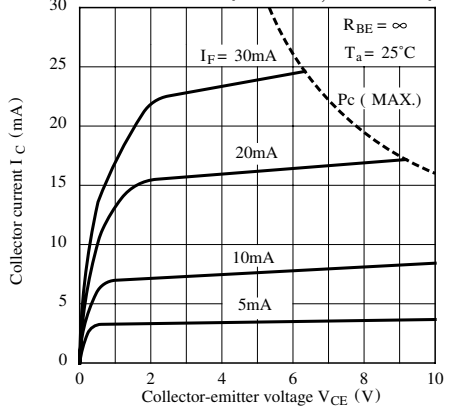


Fig. 9-a Relative Current Transfer Ratio vs. Ambient Temperature (PC110L, PC111L)

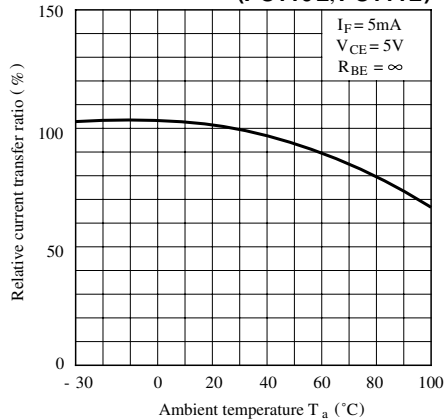


Fig. 9-b Relative Current Transfer Ratio vs. Ambient Temperature (PC112L, PC113L)

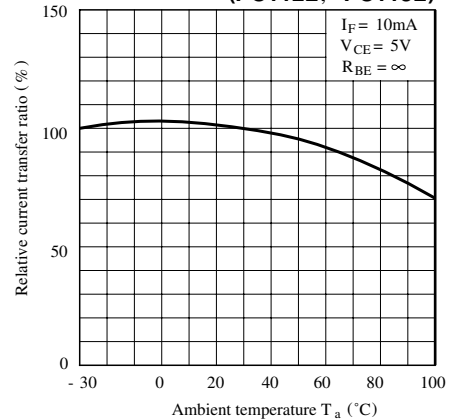


Fig.10-a Collector-emitter Saturation Voltage vs. Ambient Temperature (PC110L, PC111L)

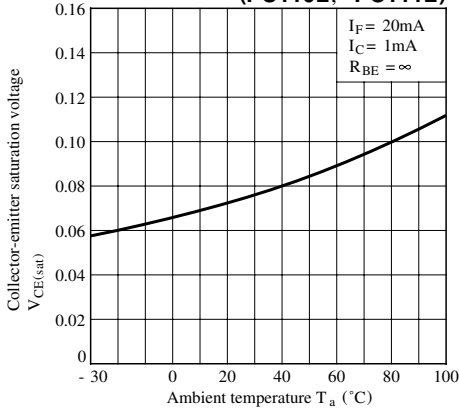


Fig.10-b Collector-emitter Saturation Voltage vs. Ambient Temperature (PC112L, PC113L)

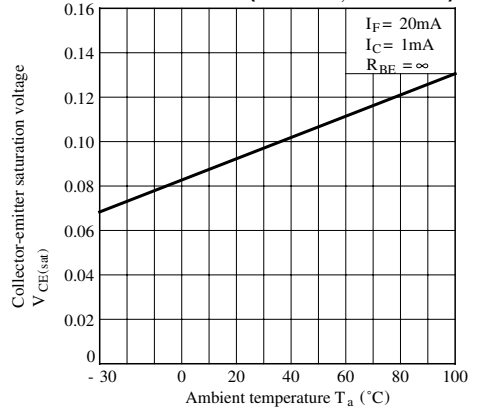


Fig.11-a Collector Dark Current vs. Ambient Temperature (PC110L, PC111L)

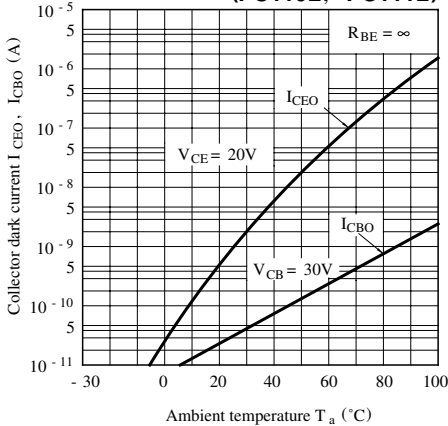


Fig.11-b Collector Dark Current vs. Ambient Temperature (PC112L, PC113L)

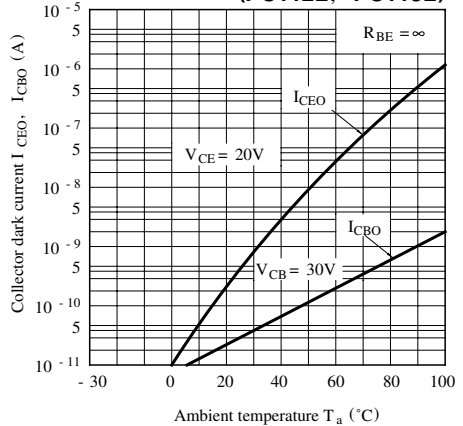


Fig.12-a Response Time vs. Load Resistance (PC110L, PC111L)

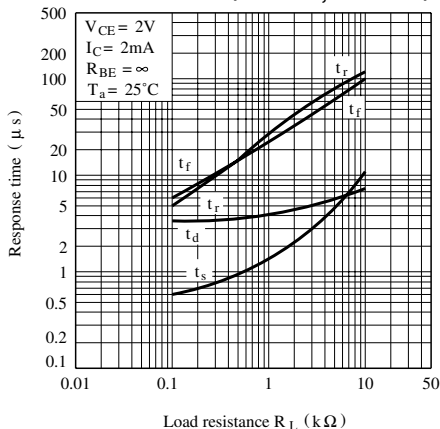
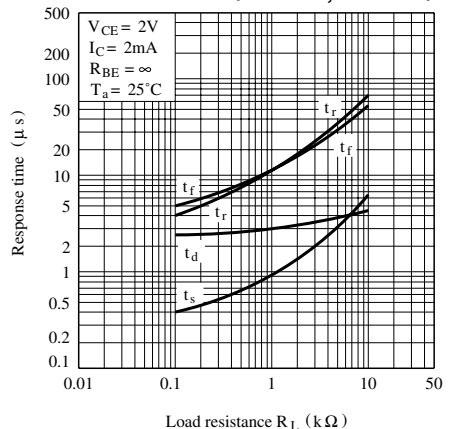
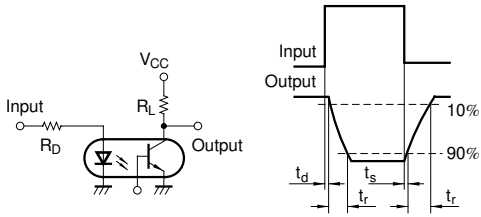


Fig.12-b Response Time vs. Load Resistance (PC112L, PC113L)

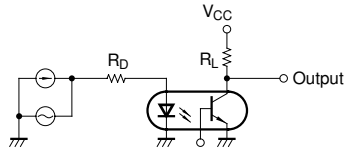


Test Circuit for Response Time



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)

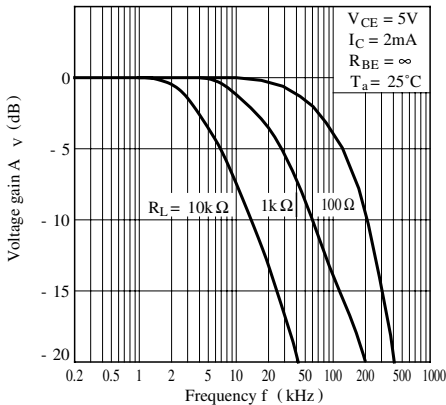


Fig.13-b Frequency Response (PC112L, PC113L)

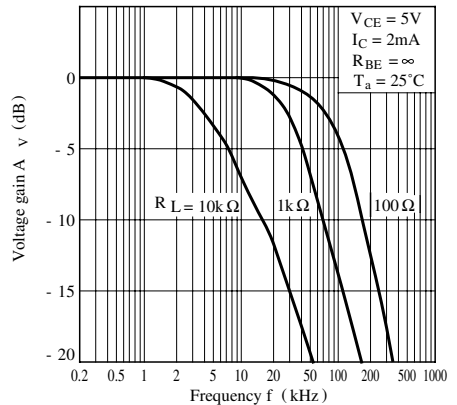


Fig.14-a Collector-emitter Saturation Voltage vs. Forward Current (PC110L, PC111L)

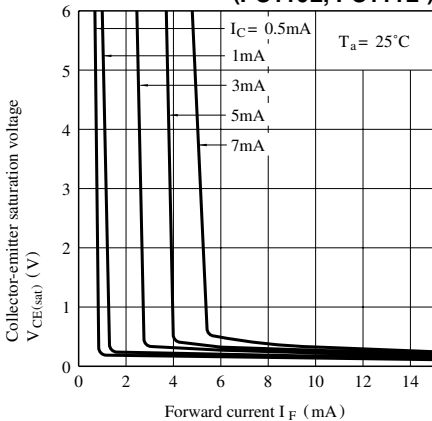
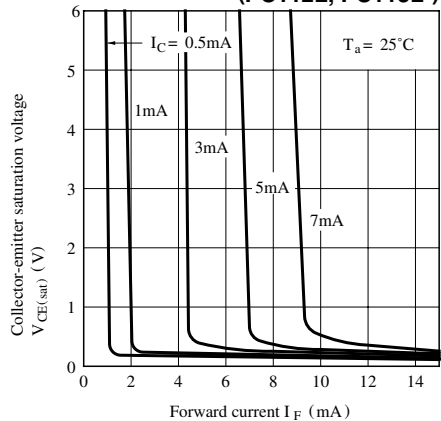


Fig.14-b Collector-emitter Saturation Voltage vs. Forward Current (PC112L, PC113L)



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