

PC110/PC111 PC112/PC113

VDE Approved, Long Creepage
Distance Type Photocoupler



■ Features

1. Long creepage distance type (Creepage distance: 8mm or more)*1
 2. Internal insulation distance: 0.5mm or more
 3. VDE approved No. 53182 and UL recognized file No. E64380
 4. High collector-emitter voltage (V_{CEO} : 70V): PC112/PC113
 5. High isolation voltage between input and output (V_{iso} : 5,000Vrms)
 6. Dual-in-line package
- *1 Allows pin-to-pin distance minus PWB land space to be 8mm or more.

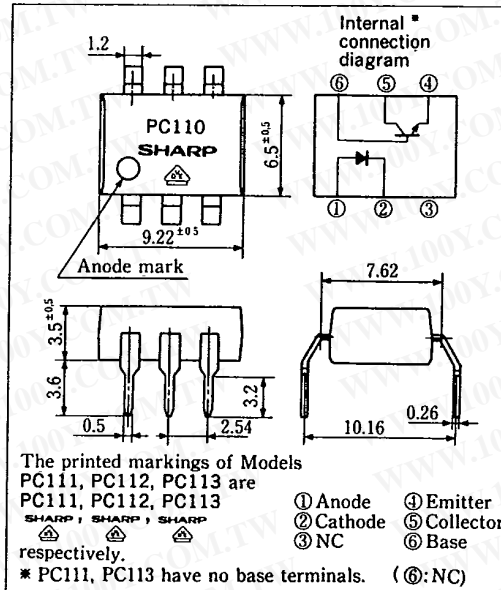
■ Applications

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

■ VDE Approval Specification (VDE 0883/6.80)

1. Environmental test class 55/125/21
2. Isolation voltage 5,000V AC for 1 minute
3. Isolation group: C group
4. Tracking resistance group: I (KB100/A)
5. Reference voltage: 500V AC/600V DC
6. Clearance creepage distance: 8.0mm (MIN.)
7. Internal insulation distance: 0.5mm (MIN.)
8. (Conformance standard of Equipment)
DIN IEC601 Part 1/VDE0750 Part 1/5.82
DIN57 804/VDE0804/1.83 DIN IEC435/
VDE0805 (Plan) Nov. 84 DIN IEC380/
VDE0806/8.81 DIN IEC65/VDE0860

■ Outline Dimensions (Unit : mm)



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■ Absolute Maximum Ratings

(Ta=25°C)

T-41-83

Parameter		Symbol	Rating	Unit	
Input	Forward current	I_F	50	mA	
	*2 Peak forward current	I_{FM}	1	A	
	Reverse Voltage	V_R	6	V	
	Power dissipation	P	70	mW	
Output	Collector-emitter voltage	V_{CEO}	PC110/PC111	35	V
			PC112/PC113	70	
	Emitter-collector voltage	V_{ECO}	6	V	
	*3 Collector-base voltage	V_{CBO}	PC110	35	V
			PC112	70	
	*3 Emitter-base voltage	V_{EBO}	6	V	
	Collector current	I_C	50	mA	
	Collector power dissipation	P_C	PC110/PC111	150	mW
			PC112/PC113	160	
	Total power dissipation	P_{tot}	PC110/PC111	170	mW
PC112/PC113			200		
*4 Isolation voltage	V_{iso}	5,000	Vrms		
Operating temperature	T_{opr}	-30 ~ +100	°C		
Storage temperature	T_{stg}	-55 ~ +125	°C		
*5 Soldering temperature	T_{sol}	260	°C		

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- *2 Pulse width $\leq 100\mu s$, Duty ratio = 0.001
- *3 Applies only to PC110, PC112.
- *4 RH = 40 ~ 60%, 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}	$V_{CE} = 20V, I_F = 0, **R_{BE} = \infty$	—	—	10^{-7}	A	
	*7 Current transfer ratio	CTR	$I_F = 5mA, V_{CE} = 5V, **R_{BE} = \infty$	50	100	400	%	
$I_F = 10mA, V_{CE} = 5V, **R_{BE} = \infty$			40	—	320			
Transfer characteristics	Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_F = 20mA, I_C = 1mA, **R_{BE} = \infty$	—	0.1	0.2	V	
	Isolation resistance	R_{iso}	DC500V, RH = 40 ~ 60%	5×10^{10}	1×10^{11}	—	Ω	
	Floating capacitance	C_f	$V = 0, f = 1MHz$	—	0.6	1.0	pF	
	Cut-off frequency	f_c	$V_{CE} = 5V, I_C = 2mA, R_L = 100\Omega, **R_{BE} = \infty$	—	80	—	kHz	
	Response time (Rise)	t_r	$V_{CE} = 2V, I_C = 2mA$	PC110/PC111	—	4	18	μs
				PC112/PC113	—	4	15	
	Response time (Fall)	t_f	$R_L = 100\Omega, **R_{BE} = \infty$	PC110/PC111	—	3	18	μs
PC112/PC113				—	3	15		

- *6 Applies only to PC110, PC112.
- *7 Classification table of current transfer ratio is shown below.

PC110/PC111		PC112/PC113	
Model No.	CTR (%)	Model No.	CTR (%)
PC110A/PC111A	50 ~ 125	PC112A/PC113A	40 ~ 120
PC110B/PC111B	100 ~ 250	PC112B/PC113B	80 ~ 200
PC110AB/PC111AB	50 ~ 250	PC112AB/PC113AB	40 ~ 200
PC110/PC111	50 ~ 400	PC112/PC113	40 ~ 320

Fig. 1 Forward Current vs. Ambient Temperature

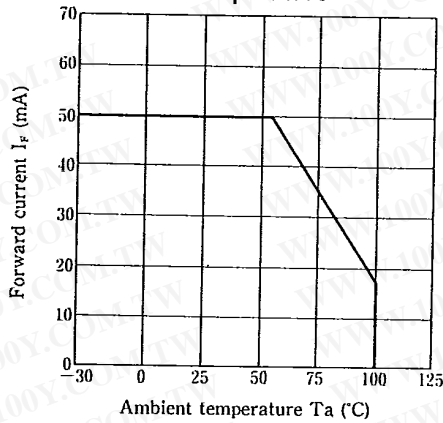


Fig. 2 Collector Power Dissipation vs. Ambient Temperature

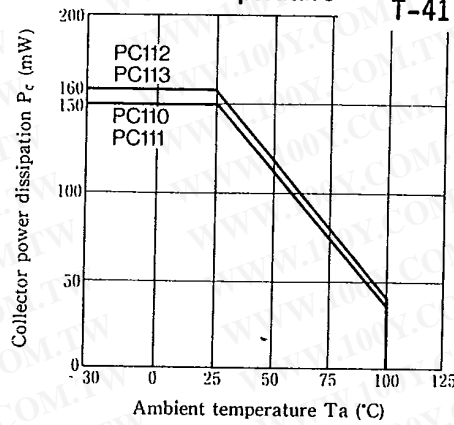


Fig. 3 Peak Forward Current vs. Duty Ratio

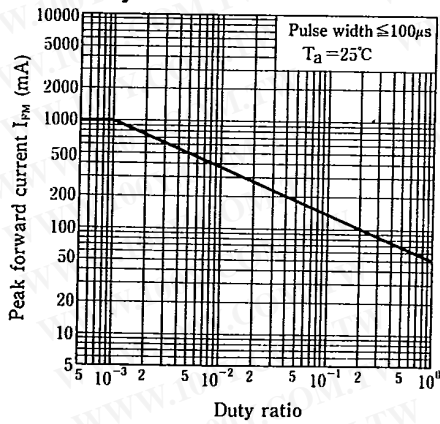
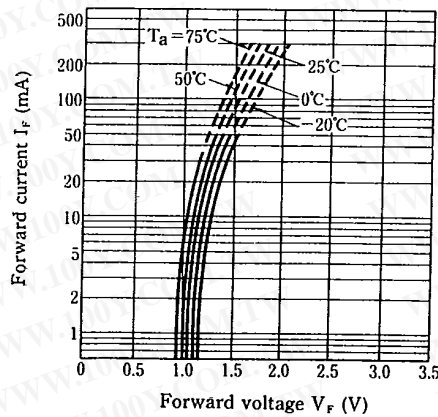


Fig. 4 Forward Current vs. Forward Voltage



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Fig. 5 Current Transfer Ratio vs. Forward Current (PC110, PC111*)

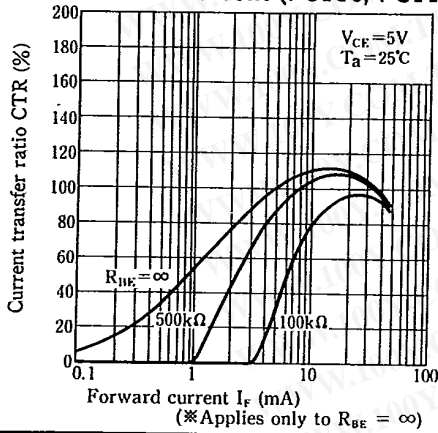
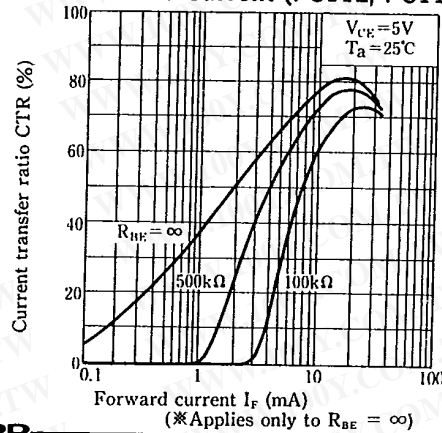


Fig. 6 Current Transfer Ratio vs. Forward Current (PC112, PC113*)



SHARP

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Fig. 7 Collector Current vs. Collector-emitter Voltage (PC110, PC111)

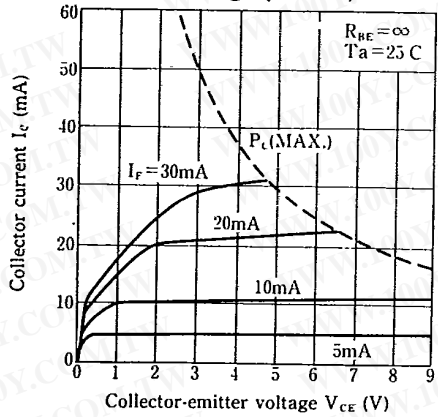


Fig. 8 Collector Current vs. Collector-emitter Voltage (PC112, PC113)

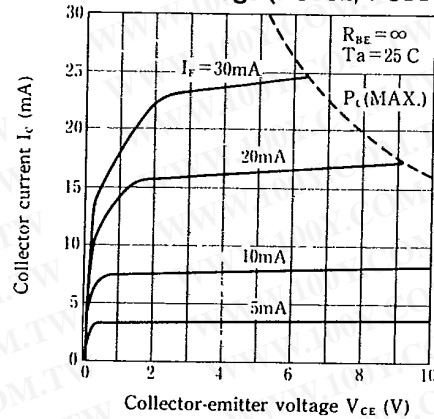


Fig. 9 Relative Current Transfer Ratio vs. Ambient Temperature (PC110, PC111)

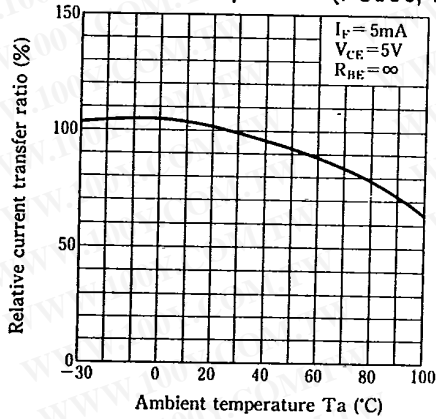


Fig. 10 Relative Current Transfer Ratio vs. Ambient Temperature (PC112, PC113)

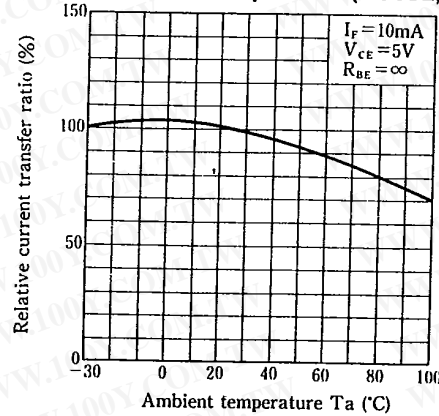


Fig. 11 Collector-emitter Saturation Voltage vs. Ambient Temperature (PC110, PC111)

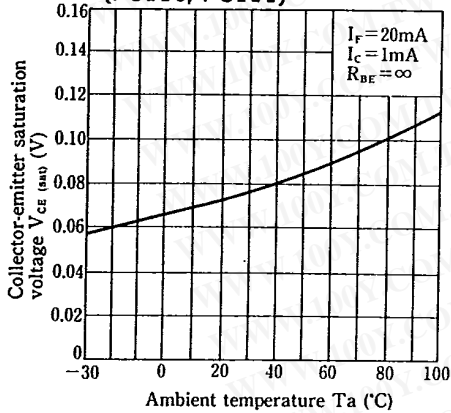
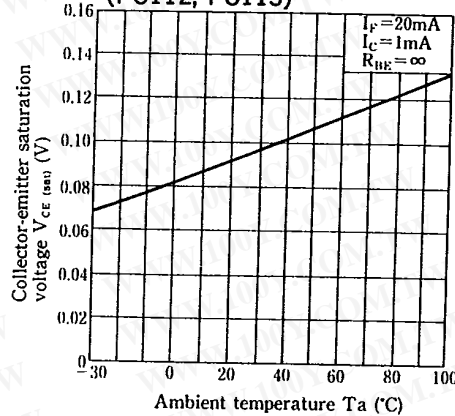


Fig. 12 Collector-emitter Saturation Voltage vs. Ambient Temperature (PC112, PC113)



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Fig. 13 Collector Dark Current vs. Ambient Temperature (PC110, PC111)

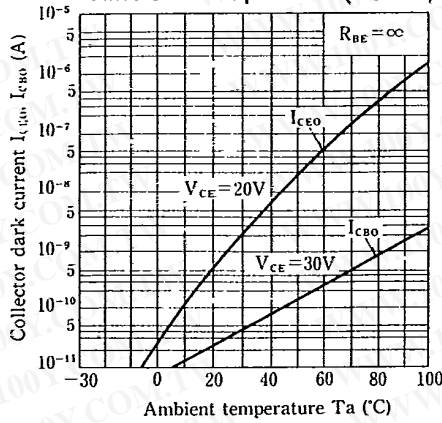


Fig. 14 Collector Dark Current vs. Ambient Temperature (PC112, PC113)

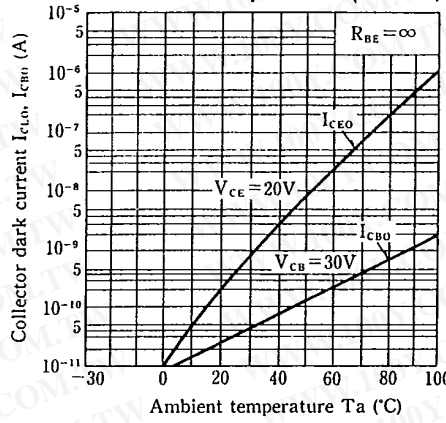


Fig. 15 Response Time vs. Load Resistance (PC110, PC111)

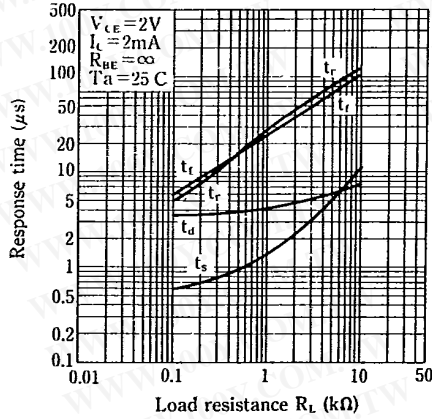
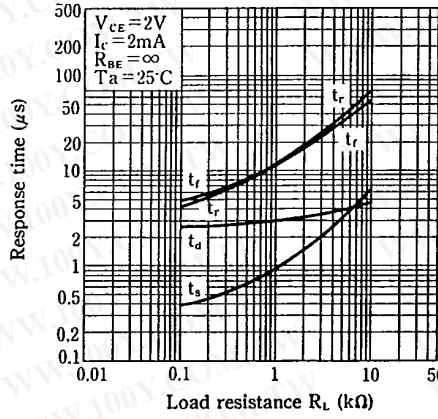
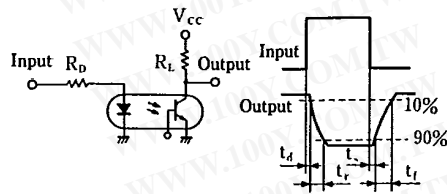


Fig. 16 Response Time vs. Load Resistance (PC112, PC113)



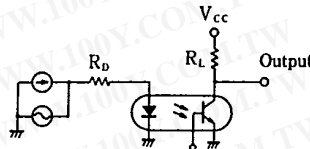
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Test Circuit for Response Time



(PC111, PC113 have no base terminal.)

Test Circuit for Frequency Response



(PC111, PC113 have no base terminal.)

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Fig. 17 Frequency Response
(PC110, PC111)

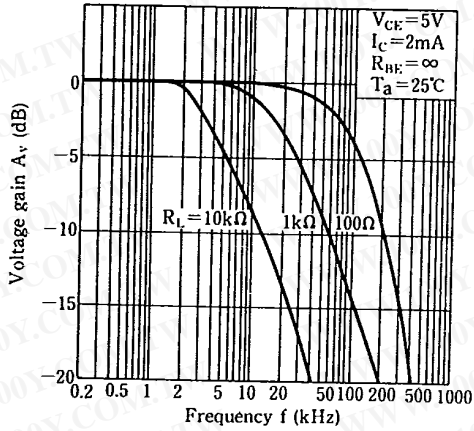


Fig. 18 Frequency Response
(PC112, PC113)

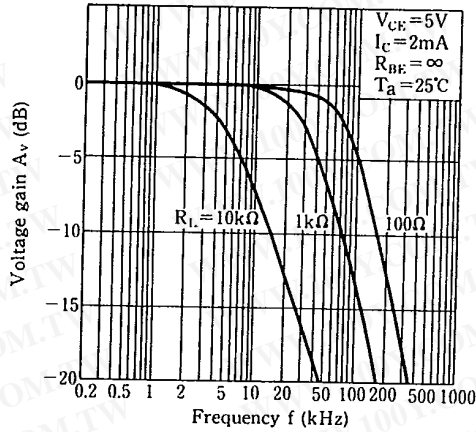


Fig. 19 Collector-emitter Saturation
Voltage vs. Forward Current
(PC110, PC111)

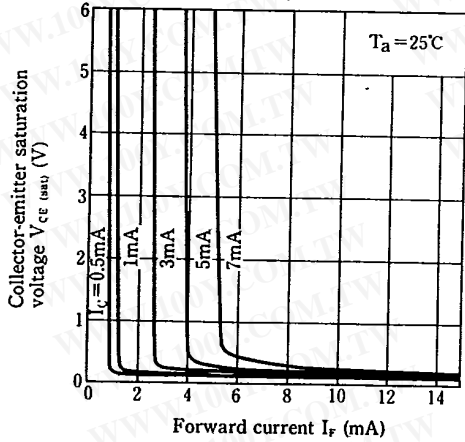
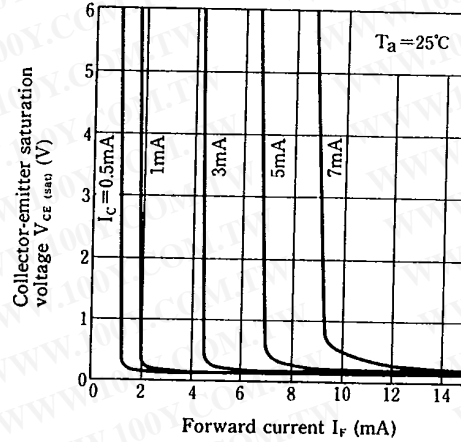


Fig. 20 Collector-emitter Saturation
Voltage vs. Forward Current
(PC112, PC113)



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