T-41-83

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.

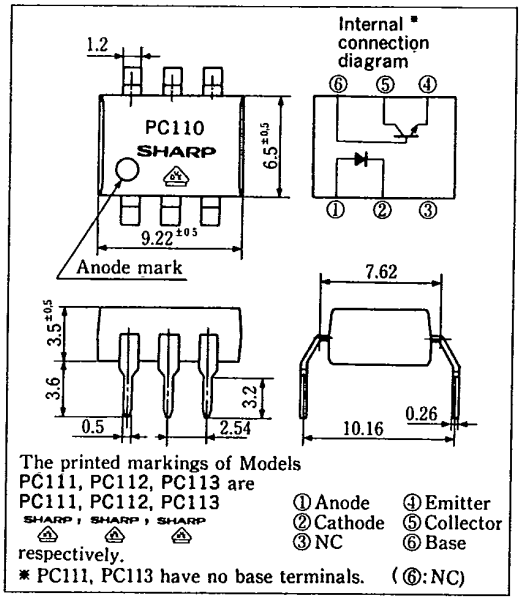
■ Applications

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)



The printed markings of Models PC111, PC112, PC113 are PC111, PC112, PC113 SHARP, SHARP, SHARP respectively.

①Anode ④Emitter
②Cathode ⑤Collector
③NC ⑥Base

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

6

T-41-83

■ 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	PC110/PC111	V_{CEO}	35	V
		PC112/PC113		70	
	Emitter-collector voltage		V_{ECO}	.6	V
	*3Collector-base voltage	PC110	V_{CBO}	35	V
		PC112		70	
	*3Emitter-base voltage	PC110/PC112	V_{EBO}	6	V
	Collector current		I_C	50	mA
	Collector power dissipation	PC110/PC111	P_C	150	mW
		PC112/PC113		160	
	Total power dissipation	PC110/PC111	P_{tot}	170	mW
		PC112/PC113		200	
*4Isolation voltage			V_{iso}	5,000	Vrms
Operating temperature			T_{opr}	−30~+100	°C
Storage temperature			T_{stg}	−55~+125	°C
*5Soldering temperature			T_{sol}	260	°C

*2 Pulse width≦100μs, 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, *6R_{BE}=∞	—	—	10^{-7}	A
Transfer characteristics	*7Current transfer ratio	PC110/PC111	CTR	I_F=5mA, V_{CE}=5V, *6R_{BE}=∞	50	100	400	%
		PC112/PC113		I_F=10mA, V_{CE}=5V, *6R_{BE}=∞	40	—	320	
	Collector-emitter saturation voltage		$V_{CE(sat)}$	I_F=20mA, I_C=1mA, *6R_{BE}=∞	—	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=100Ω, *6R_{BE}=∞	—	80	—	kHz
	Response time (Rise)	PC110/PC111	t_r	V_{CE}=2V, I_C=2mA, R_L=100Ω, *6R_{BE}=∞	—	4	18	μs
		PC112/PC113			—	4	15	
	Response time (Fall)	PC110/PC111	t_f		—	3	18	μs
		PC112/PC113			—	3	15	

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

PC110/PC111

Model No.	CTR (%)
PC110A/PC111A	50~125
PC110B/PC111B	100~250
PC110AB/PC111AB	50~250
PC110/PC111	50~400

PC112/PC113

Model No.	CTR (%)
PC112A/PC113A	40~120
PC112B/PC113B	80~200
PC112AB/PC113AB	40~200
PC112/PC113	40~320

T-41-83

Fig. 1 Forward Current vs. Ambient Temperature

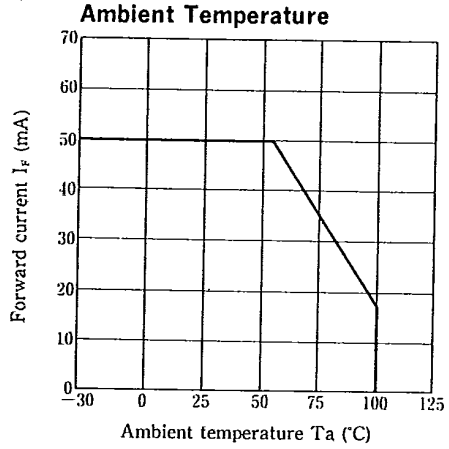


Fig. 2 Collector Power Dissipation vs. Ambient Temperature

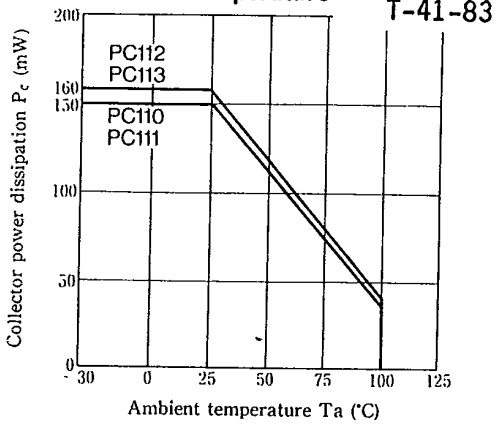


Fig. 3 Peak Forward Current vs. Duty Ratio

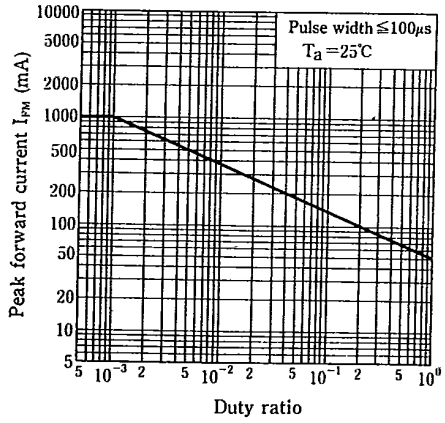


Fig. 4 Forward Current vs. Forward Voltage

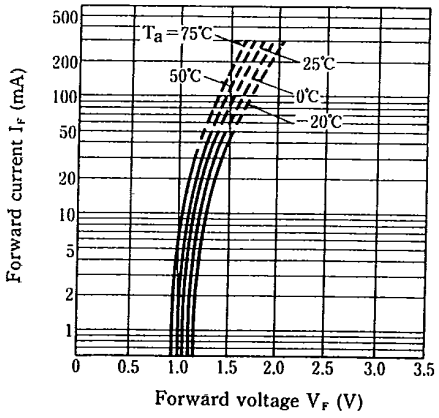


Fig. 5 Current Transfer Ratio vs. Forward Current (PC110, PC111*)

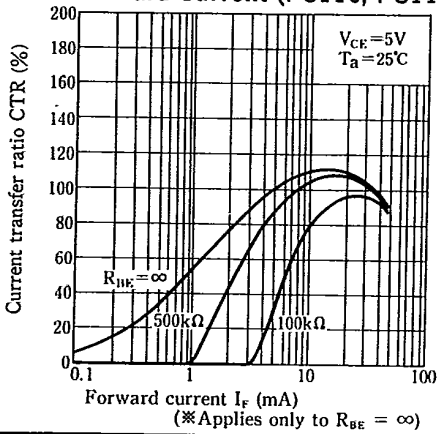
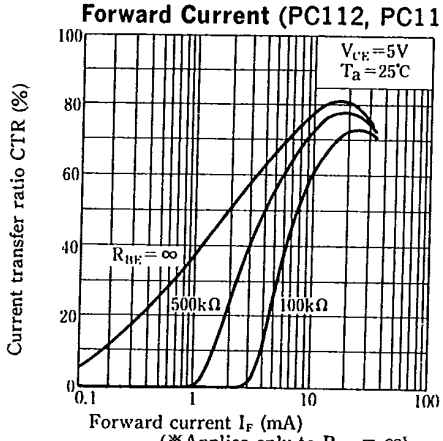


Fig. 6 Current Transfer Ratio vs. Forward Current (PC112, PC113*)



6

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

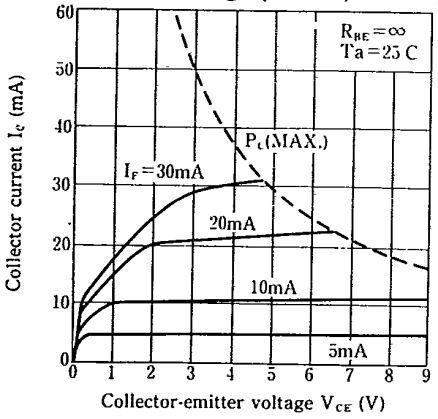


Fig. 8 Collector Current vs. Collector-emitter Voltage (PC112, PC113)

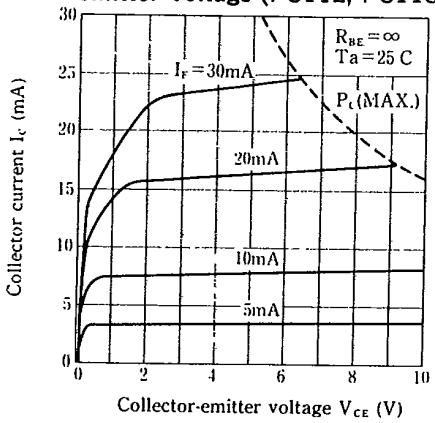


Fig. 9 Relative Current Transfer Ratio vs. Ambient Temperature (PC110, PC111)

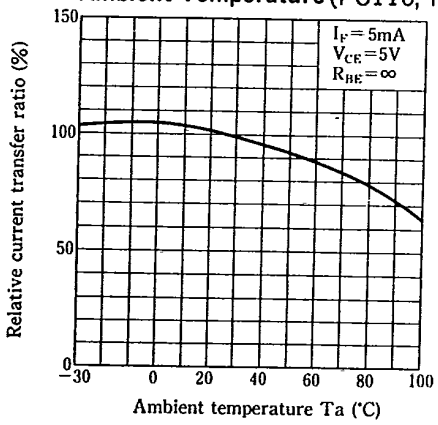


Fig. 10 Relative Current Transfer Ratio vs. Ambient Temperature (PC112, PC113)

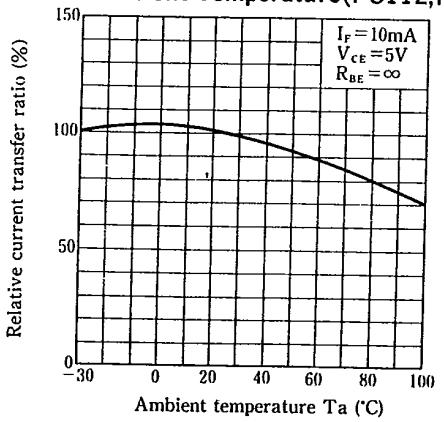


Fig. 11 Collector-emitter Saturation Voltage vs. Ambient Temperature (PC110, PC111)

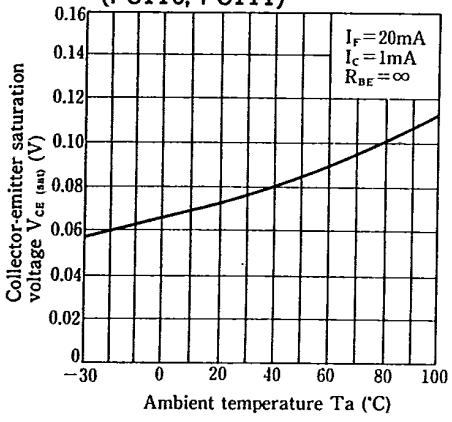


Fig. 12 Collector-emitter Saturation Voltage vs. Ambient Temperature (PC112, PC113)

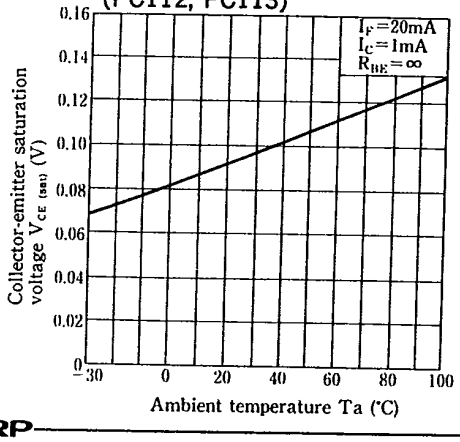


Fig. 13 Collector Dark Current vs. Ambient Temperature (PC110, PC111)

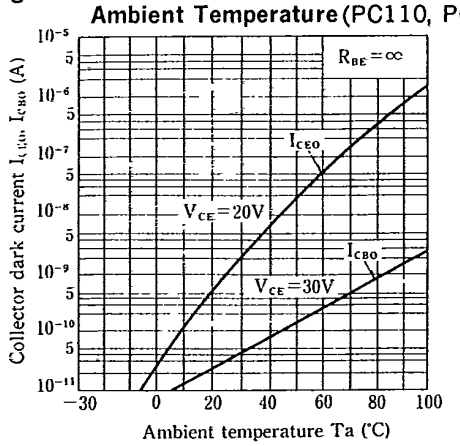


Fig. 14 Collector Dark Current vs. Ambient Temperature (PC112, PC113)

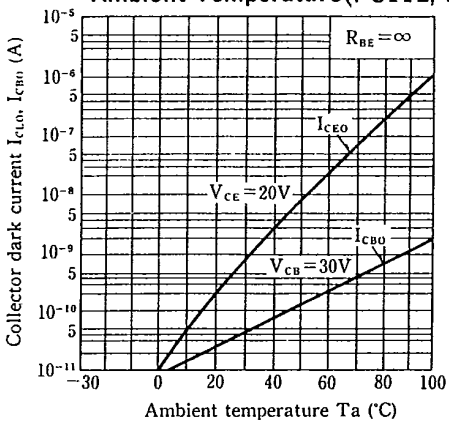


Fig. 15 Response Time vs. Load Resistance (PC110, PC111)

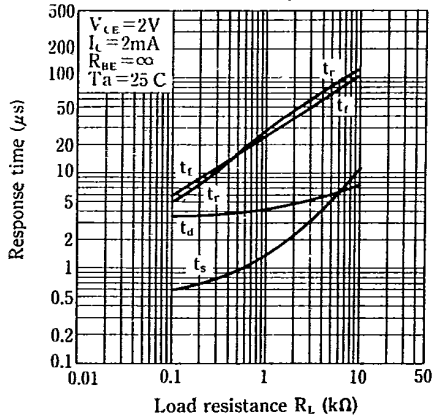
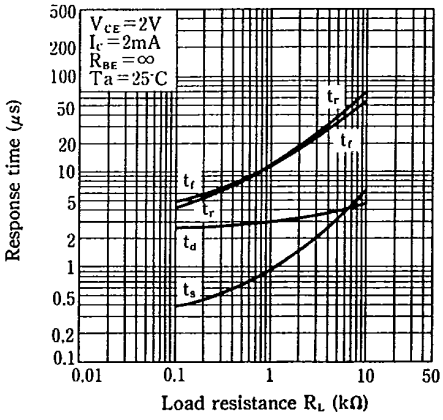
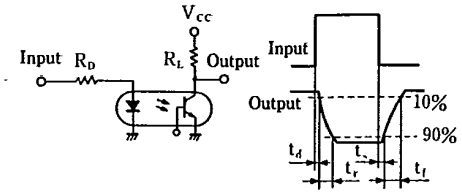


Fig. 16 Response Time vs. Load Resistance (PC112, PC113)

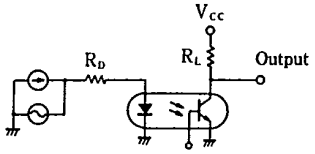


Test Circuit for Response Time



(PC111,PC113 have no base terminal.)

Test Circuit for Frequency Response



(PC111, PC113 have no base terminal.)

6

Fig. 17 Frequency Response (PC110, PC111)

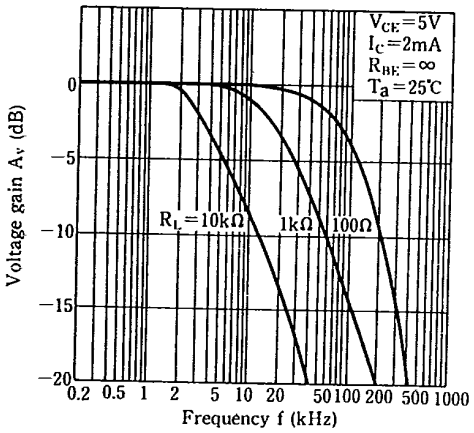


Fig. 18 Frequency Response (PC112, PC113)

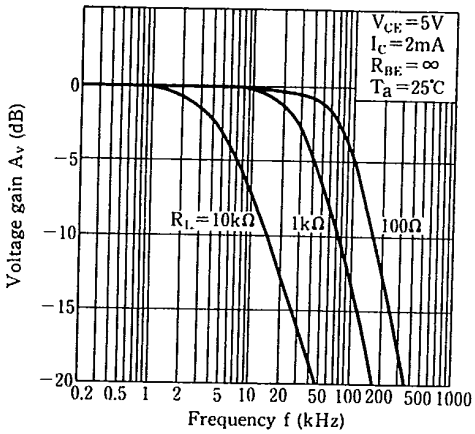


Fig. 19 Collector-emitter Saturation Voltage vs. Forward Current (PC110, PC111)

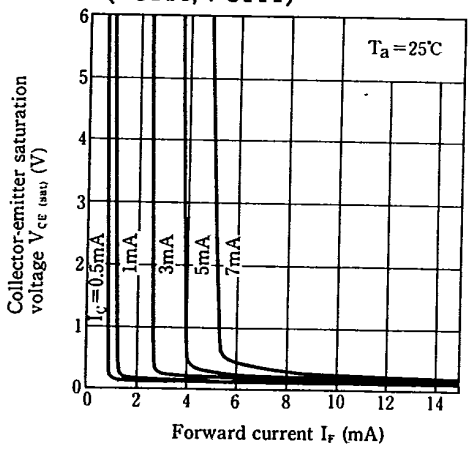


Fig. 20 Collector-emitter Saturation Voltage vs. Forward Current (PC112, PC113)