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T Yoshikawa	Mar 28 1996	ELECTRONIC COMPONENTS GROUP SHARP CORPORATION	REPRESENTATIVE DIVISION	OPTO-ELECTRONIC DEVICES DIV.

SPECIFICATION

DEVICE SPECIFICATION FOR

PHOTOCOUPLER

MODEL No.

PC900V

Business dealing name

	PC900V
	PC900VY

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2. When using this product, please observe the absolute maximum ratings and the instructions for use outlined in these specification sheets, as well as the precautions mentioned below. Sharp assumes no responsibility for any damage resulting from use of the product which does not comply with the absolute maximum ratings and the instructions included in these specification sheets, and the precautions mentioned below.

   (Precautions)

   (1) This product is designed for use in the following application areas ;

   [· OA equipment · Audio visual equipment · Home appliances
   · Telecommunication equipment (Terminal) · Measuring equipment
   · Tooling machines · Computers]

   If the use of the product in the above application areas is for equipment listed in paragraphs (2) or (3), please be sure to observe the precautions given in those respective paragraphs.

   (2) Appropriate measures, such as fail-safe design and redundant design considering the safety design of the overall system and equipment, should be taken to ensure reliability and safety when this product is used for equipment which demands high reliability and safety in function and precision, such as ;

   [· Transportation control and safety equipment (aircraft, train, automobile etc.)
   · Traffic signals · Gas leakage sensor breakers · Rescue and security equipment
   · Other safety equipment]

   (3) Please do not use this product for equipment which require extremely high reliability and safety in function and precision, such as ;

   [· Space equipment · Telecommunication equipment (for trunk lines)
   · Nuclear power control equipment · Medical equipment]

   (4) Please contact and consult with a Sharp sales representative if there are any questions regarding interpretation of the above three paragraphs.

3. Please contact and consult with a Sharp sales representative for any questions about this product.

CUSTOMER'S APPROVAL

DATE

BY

DATE PRESENTED BY T. M

T. Matsumura,
Department General Manager of
Engineering Dept.,II
Opto-Electronic Devices Div.
ELECOM Group
SHARP CORPORATION

1. Application

This specification applies to the outline and characteristics of photocopier Model No. PC900V.

2. Outline

Refer to the attached drawing No. CY5440K02.

3. Ratings and characteristics

Refer to the attached sheet, page 3 to 5.

4. Reliability

Refer to the attached sheet, page 8.

5. Incoming inspection

Refer to the attached sheet, page 9.

6. Supplement

6.1 Isolation voltage shall be measured in the following method.

(1) Short among pins 1 to 3 on the primary side and among pins 4 to 6 on the secondary side.

(2) The dielectric withstand tester with zero-cross circuit shall be used.

(3) The wave form of applied voltage shall be a sine wave.
(It is recommended that the isolation voltage be measured in insulation oil.)

6.2 Business dealing name
("○" mark indicates business dealing name of ordered product)

Product	Business dealing name	Remarks
○	PC900V	
	PC900VY	Applied to products as a option (Attached sheets -2-1 to 2-4.)

6.3 This Model is approved by UL.

Approved Model No. : PC900V

UL file No. : E64380

6.4 Theory of operation

(1) When the forward current of above the "H→L" threshold input current (I_{FHL}) is applied to the input side, the output will go "Low level".

(2) When the forward current on the input side goes below the "L→H" threshold input current (I_{FLH}) the output will go "High level".

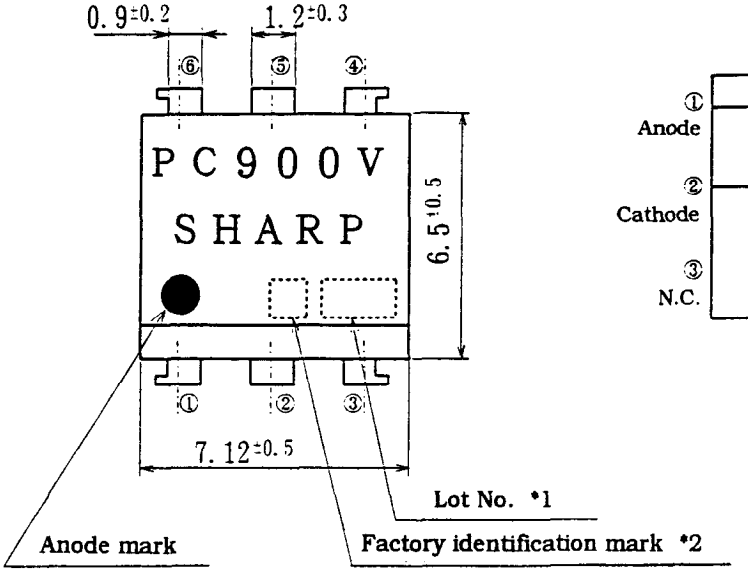
6.5 This product is not designed against irradiation.

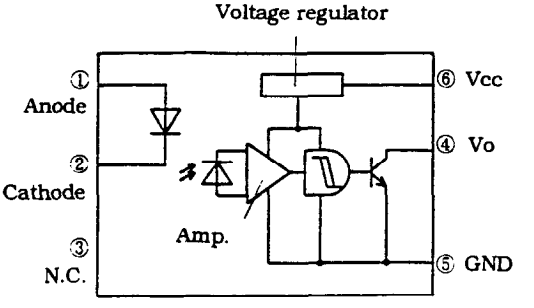
This product is assembled with electrical input and output.

This product incorporates non-coherent light emitting diode.

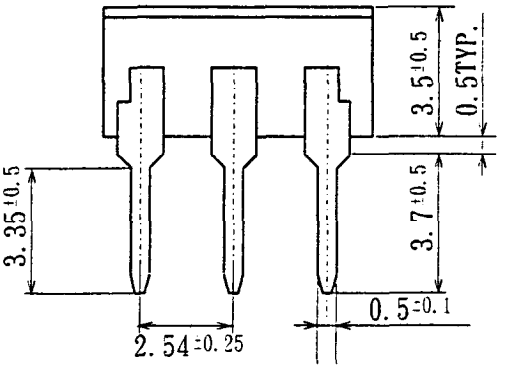
7. Notes

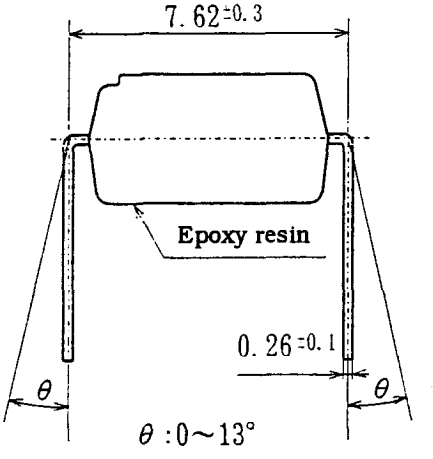
Refer to the attached sheet-1-1, 2.





Pin Nos. and internal connection diagram





*1) 2-digit number shall be marked according to DIN standard.

*2) Factory identification mark shall be or shall not be marked.

UNIT : 1/1 mm	
Name	PC900V Outline Dimensions (Business dealing name : PC900V)
Drawing No.	CY5440K02

3. Ratings and characteristics

3.1 Absolute maximum ratings

Ta=25℃

Parameter		Symbol	Rating	Unit
Input	*1 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	Supply voltage	Vcc	16	V
	High level output voltage	V_{OH}	16	V
	Low level output current	I_{OL}	50	mA
	*1 Power dissipation	Po	150	mW
*1 Total power dissipation		Ptot	170	mW
*3 Isolation voltage		Viso	5.0	kVrms
Operating temperature		Topr	-25 to +85	℃
*4 Storage temperature		Tstg	-40 to 125	℃
*4 Soldering temperature		Tsol	260	℃

*1 The derating factors of absolute maximum ratings due to ambient temperature are shown in Fig. 1, 2, 3.

*2 Pulse width≦100 μs, Dutyratio : 0.001

*3 AC for 1 min, 40 to 60%RH

*4 For 10 s

3.2 Electro-optical characteristics

(Unspecified : Ta=0 to 70℃)

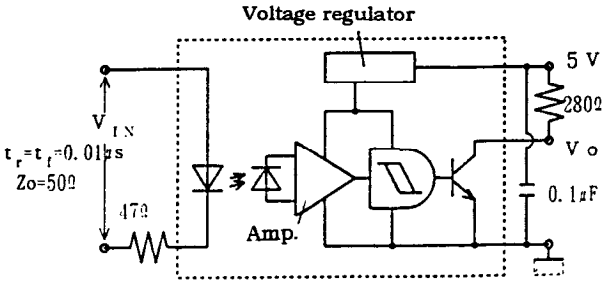
Parameter			Symbol	MIN.	TYP.	MAX.	Unit	Conditions
Input	Forward voltage		V_F	-	1.1	1.4	V	I_F=4mA
				0.7	1.0	-		I_F=0.3mA
	Reverse current		I_R	-	-	10	μA	Ta=25℃, V_R=3V
	Terminal capacitance		Ct	-	30	250	pF	Ta=25℃, V=0 f=1kHz
Output	Operating supply voltage range		Vcc	3	-	15	V	
	Low level output voltage		V_{OL}	-	0.2	0.4	V	I_{OL}=16mA, Vcc=5V I_F=4mA
	High level output voltage		I_{OH}	-	-	100	μA	Vcc=Vo=15V I_F=0mA
	Low level supply current		I_{CCL}	-	2.5	5.0	mA	Vcc=5V, I_F=4mA
	High level supply current		I_{CCH}	-	1.0	5.0	mA	Vcc=5V, I_F=0mA
Transfer characteristics	"H→L" threshold input current *1		I_{FHL}	-	1.1	2.0	mA	Ta=25℃, Vcc=5V R_L=280 Ω
				-	-	4.0		Vcc=5V, R_L=280 Ω
	"L→H" threshold input current *2		I_{FLH}	0.4	0.8	-	mA	Ta=25℃,Vcc=5V R_L=280 Ω
				0.3	-	-		Vcc=5V, R_L=280 Ω
	Hysteresis *3		I_{FLH}/I_{FHL}	0.5	0.7	0.9		Vcc=5V, R_L=280 Ω
	Isolation resistance		Riso	5×10^{10}	10^{11}	-	Ω	Ta=25℃, DC500V 40 to 60%RH
	Response time	"H→L" propagation time	t_{PHL}	-	1	3	μs	Ta=25℃ Vcc=5V, I_F=4mA R_L=280 Ω
		"L→H" propagation time	t_{PLH}	-	2	6		
		Fall time	tf	-	0.05	0.5		
		Rise time	tr	-	0.1	0.5		

*1 I_{FHL} represents forward current when output goes from "H" to "L".

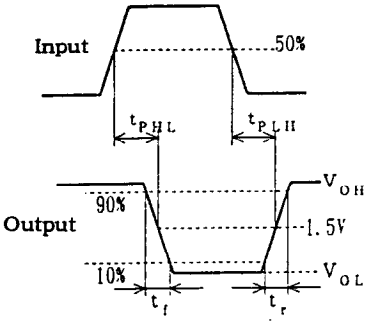
*2 I_{FLH} represents forward current when output goes from "L" to "H".

*3 Hysteresis : I_{FLH}/I_{FHL}

*4 Test circuit for response time shall be shown below.

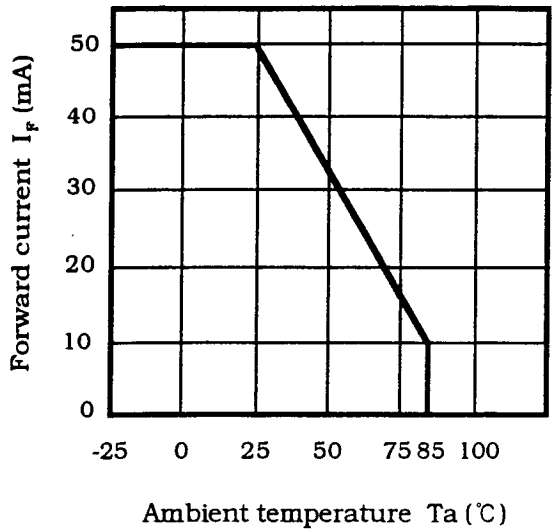


Test circuit diagram

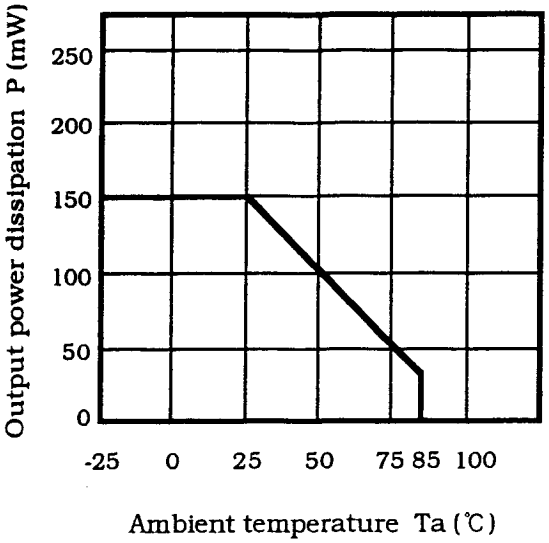


Timing chart

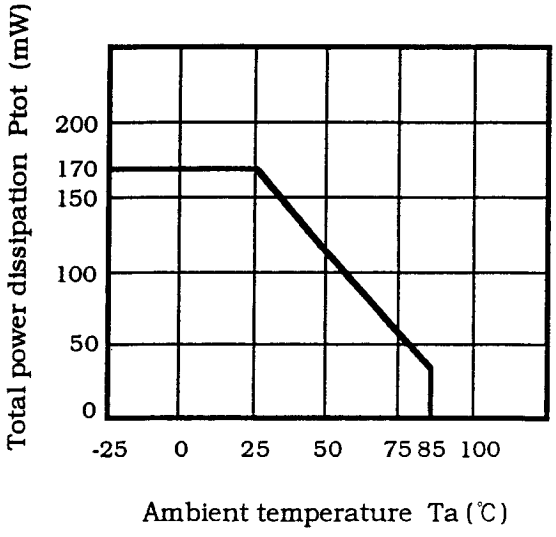
(Fig. 1) Forward current vs. ambient temperature



(Fig. 2) Output power dissipation vs. ambient temperature



(Fig. 3) Total power dissipation vs. ambient temperature



4. Reliability

The reliability of products shall be satisfied with items listed below.

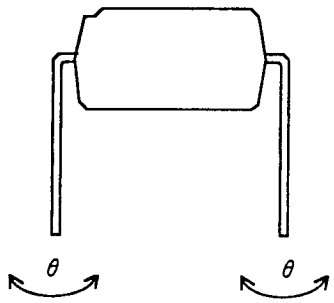
Confidence level : 90%
LTPD : 10%/20%

Test Items	Test Conditions *1	Failure Judgement Criteria	Samples (n) Defective(C)
Solderability *2	230℃, 5 s	——	n=11, C=0
Soldering heat	260℃, 10 s	V_F>U×1.2	n=11, C=0
Terminal strength (Tension)	Weight : 5N 5 s/each terminal	I_R>U×2	n=11, C=0
Terminal strength (Bending) *3	Weight : 2.5N 2 times/each terminal	V_{OL}>U×1.2 I_{OH}>U×1.2	n=11, C=0
Mechanical shock	15000m/s^2, 0.5ms 3 times/±X, ±Y, ±Z direction	I_{CCL}>U×1.2	n=11, C=0
Variable frequency vibration	100 to 2000 to 100Hz/4min 200m/s^2 4 times/ X, Y, Z direction	I_{CCH}>U×1.2 I_{FHL}>U×1.3	n=11, C=0
Temperature cycling	1 cycle -40℃ to +125℃ (30min) (30min) 20 cycles test	I_{FLH}<L×0.8 I_{FLH}/I_{FHL}≠L×0.8 ~U×1.2	n=22,C=0
High temp. and high humidity storage	+60℃, 90%RH, 1000h	U : Upper specification limit	n=22,C=0
High temp. storage	+125℃, 1000h		n=22,C=0
Low temp. storage	-40℃, 1000h	L : Lower specification limit	n=22,C=0
Operation life	I_F=10mA, Vcc=15V I_{OL}=16mA, Ta=25℃, 1000h		n=22,C=0

*1 Test method, conforms to JIS C 7021.

*2 Solder shall adhere at the area of 95% or more of immersed portion of lead and pin hole or other holes shall not be concentrated on one portion.

*3 Terminal bending direction is shown below.



5. Incoming inspection

5.1 Inspection items

(1) Electrical characteristics

V_F, I_R, V_{OL}, I_{OH}, I_{CCL}, I_{CCH}, I_{FHL}, I_{FLH}, Riso, Viso

(2) Appearance

5.2 Sampling method and Inspection level

A single sampling plan, normal inspection level II based on ISO 2859 is applied. The AQL according to the inspection items are shown below.

Defect	Inspection item	AQL (%)
Major defect	Electrical characteristics Unreadable marking	0.1
Minor defect	Appearance defect except the above mentioned.	0.4

Precautions for Photocouplers

1. For cleaning

   (1) Solvent cleaning : Solvent temperature 45℃ or less
   Immersion for 3 min or less

   (2) Ultrasonic cleaning : The affect to device by ultrasonic cleaning is different by cleaning bath size, ultrasonic power output, cleaning time, PWB size or device mounting condition etc. Please test it in actual using condition and confirm that doesn't occur any defect before starting the ultrasonic cleaning.

   (3) Applicable solvent : Ethyl alcohol, Methyl alcohol
   Freon TE · TF, Diflon-solvent S3-E

   Please refrain form using Chloro Fluoro Carbon type solvent to clean devise as much as possible since it is internationally restricted to protect the ozonosphere. Before you use alternative solvent you are requested to confirm that it does not attack package resin.

2. Please use the same as normal integration circuit about static electricity in order that this device is OPIC photocopier.

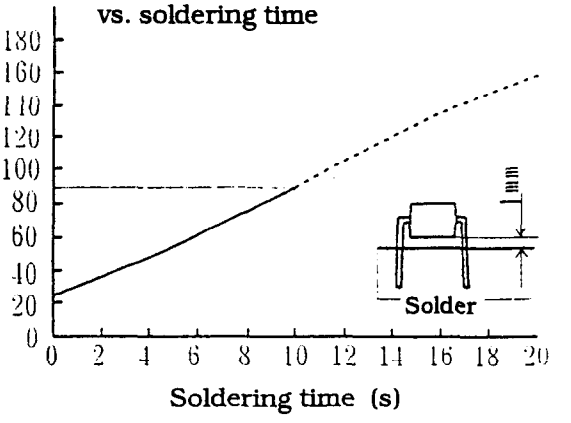
3. In order to stabilize power supply line, we recommend to connect a by-pass capacitor of 0.01 μF or more between Vcc and GND near the device.

4. The LED used in the Photocoupler generally decreases the light emission power by operation. In case of long operation time, please design the circuit with considering the decreases of the light emission power of the LED. (50%/5years)
   Please decide the input current which become 2 times of MAX. I_{FHL}.

5. Precautions for Soldering Photocouplers

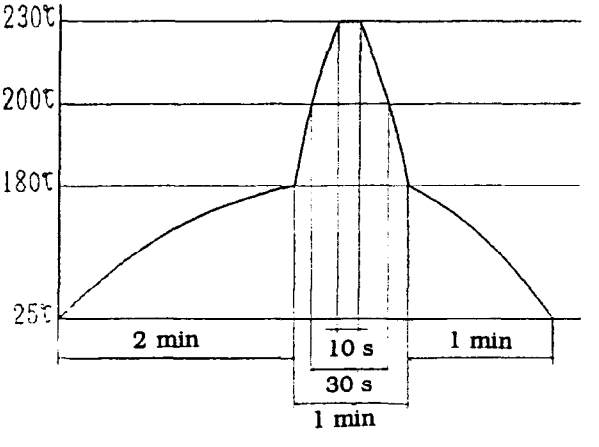
(1) In case of soldering to lead
260℃ 10 s or less

An example of device temperature vs. soldering time



(2) If solder reflow :

It is recommended that only one soldering be done at the temperature and the time within the temperature profile as shown in the figure.



(3) Other precautions

An infrared lamp used to heat up for soldering may cause a localized temperature rise in the resin. So keep the package temperature within that specified in Item (2). Also avoid immersing the resin part in the solder.

1. This specification shall be applied to photocopier, Model No. PC900V as an option.

2. Applicable Models (Business dealing name)

   PC900VY

3. The relevant models are the models Approved by TÜV Rheinland Japan according to DIN VDE0884/08.87.

   Approved Model No. : PC900V

   TÜV approved No. : R9151577
   (According to the specification DIN VDE0884/08.87)

   - Operating isolation voltage U_{IORM} : 710V (Peak)
   - Transient voltage U_{TR} : 6000V (Peak)
   - Pollution : 2 (According to VDE0110/01.89)
   - Clearances distance (Between input and output) : 6mm (MIN.)
   - Creepage distance (Between input and output) : 6mm (MIN.)
   - Isolation thickness between input and output : 0.15mm (MIN.)
   - Tracking-proof : CTI 225 (Material group IIIa : VDE0110/01.89)
   - Safety limit values Current (Isi) : 120mA (Diode side)
     Power (Psi) : 240mW (Phototransistor side)
     Temperature (Tsi) : 150℃

   In order to keep safety electric isolation of photocopier, please set the protective circuit to keep within safety limit values when the actual application equipment troubled.

   - Indication of TÜV approval prints "△0884" on sleeve package.

4. Outline

   Refer to the attached drawing No. CY5164K02.

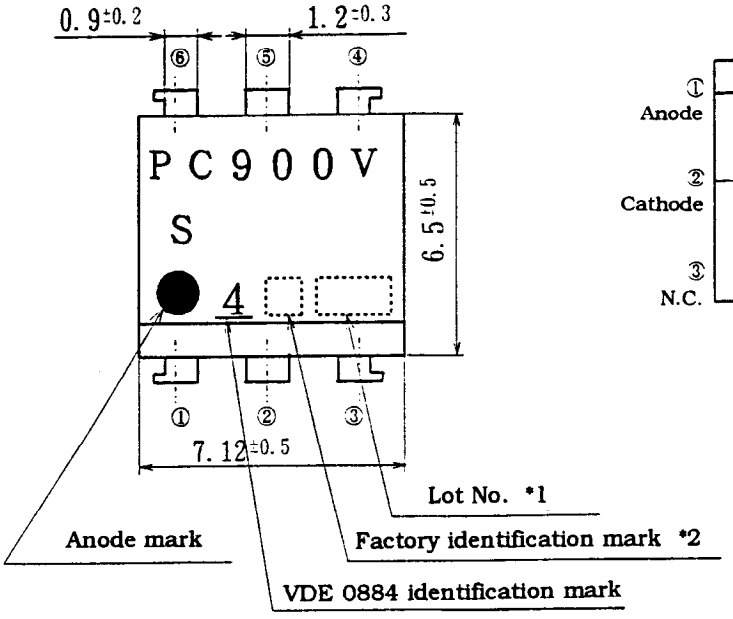
5. Isolation specification according to VDE 0884

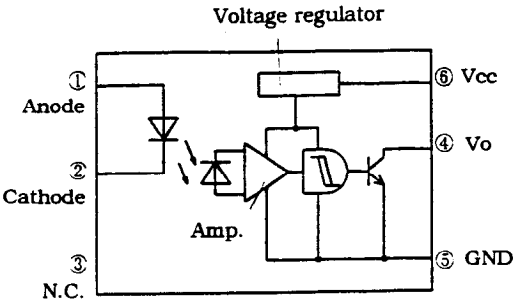
Parameter	Symbol	Conditions	Rating	Unit	Remark
Class of environmental test	-	DIN IEC68	25/85/21	-	
Pollution	-	DIN VDE0110	2	-	
Maximum operating isolation voltage	U_{IORM}	-	710	V_{PEAK}	Refer to the Diagram 1, 2
Partial discharge test voltage (Between input and output)					
Diagram 1	Upr	tp=60 s, qc<5pC	852	V_{PEAK}	
Diagram 2		tp=1 s, qc<5pC	1136	V_{PEAK}	
Maximum over-voltage	$U_{INITIAL}$	t_{INI}=10 s	6000	V_{PEAK}	
Safety maximum ratings					Refer to the Fig. 6, 7
1) Case temperature	Tsi	I_F=0, Pc=0	150	℃	
2) Input current	Isi	Pc=0	120	mA	
3) Electric power (Output or Total power dissipation)	Psi	-	240	mW	
Isolation resistance (Test voltage between input and output ; DC500V)	R_{ISO}	Ta=Tsi	MIN. 10^9	Ω	
		Ta=Topr (MAX.)	MIN. 10^{11}		
		Ta=25℃	MIN. 10^{12}		

6. Precautions in performing isolation test

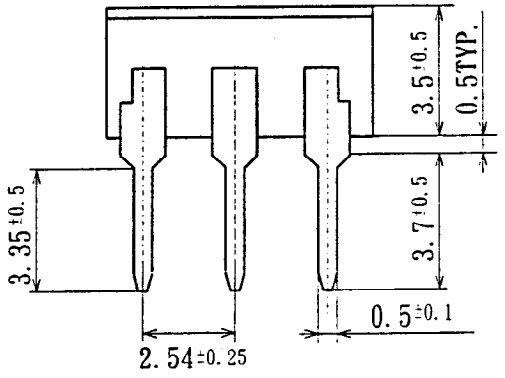
6.1 Partial discharge test methods shall be the ones according to the specifications of VDE 0884/08.87

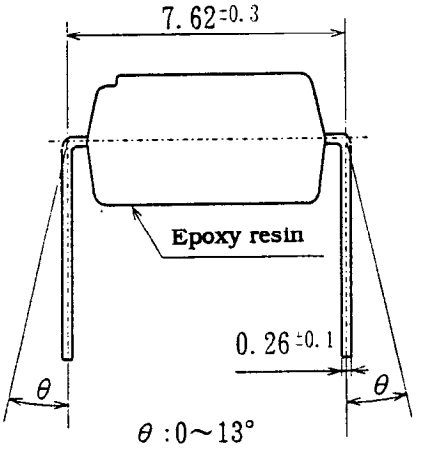
6.2 Please don't carry out isolation test (Viso) over $U_{INITIAL}$. This product deteriorates isolation characteristics by partial discharge due to applying high voltage (ex. $U_{INITIAL}$). And there is possibility that this product occurs partial discharge in operating isolation voltage. (U_{IORM}).





Pin Nos. and internal connection diagram



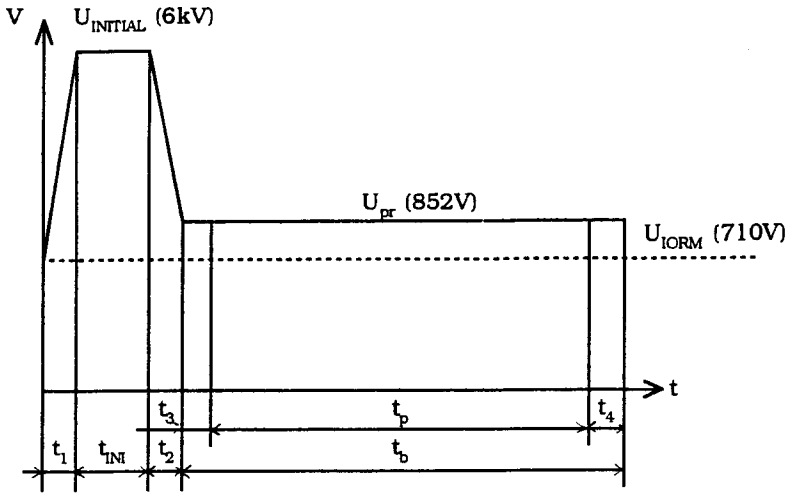


*1) 2-digit number shall be marked according to DIN standard.

*2) Factory identification mark shall be or shall not be marked.

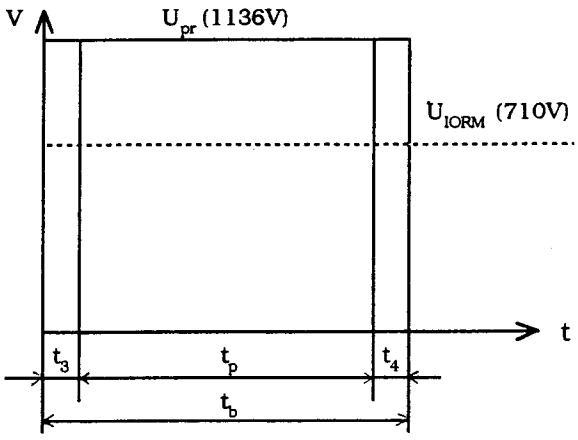
UNIT : 1/1 mm	
Name	PC900V Outline Dimensions (Business dealing name : PC900VY)
Drawing No.	CY5164K02

Method of Diagram 1 : Breakdown test (Apply to type test and sampling test)



t_1, t_2	=1 to 10 s
t_3, t_4	=1 s
t_p (Partial discharge measuring time)	=60 s
t_b	=62 s
t_{INI}	=10 s

Method of Diagram 2 : Non breakdown test (Apply to all device test)



t_3, t_4	=0.1 s
t_p (Partial discharge measuring time)	=1 s
t_b	=1.2 s

Fig. 6 Safety maximum power dissipation vs. ambient temperature (When failed)

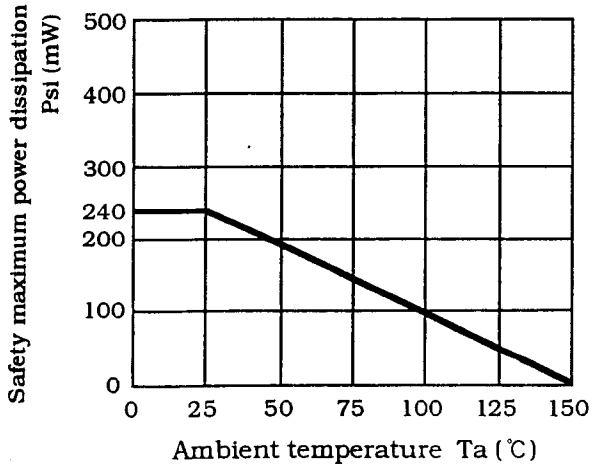


Fig. 7 Safety maximum forward current vs. ambient temperature (When failed)