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ELECTRONIC COMPONENTS GROUP
SHARP CORPORATION

SPECIFICATION

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REPRESENTATIVE DIVISION
 PHOTOVOLTAICS DIV.
 OPTO-ELECTRONIC DEVICES DIV.
 ELECTRONIC COMPONENTS DIV.

DEVICE SPECIFICATION FOR
PHOTOTRIAC COUPLER

MODEL No. S21ME4

Model No.

	S21ME4F
	S21ME4FY

1. This specification sheets include the contents under the copyright of Sharp Corporation ("Sharp"). Please keep them with reasonable care as important information. Please don't reproduce or cause anyone reproduce them without Sharp's consent.
2. Please obey the instructions mentioned below for actual use of this device.
 - (1) This device is designed for general electronic equipment. Main uses of this device are as follows;
 - [· Computer · OA equipment · Telecommunication equipment (Terminal)
· Measuring equipment · Tooling machine · AV equipment
· Home appliance, etc.]
 - (2) Please take proper steps in order to maintain reliability and safety, in case this device is used for the uses mentioned below which require high reliability.
 - [· Unit concerning control and safety of a vehicle (air plane, train, automobile etc.) · Gas leak detection breaker · Traffic signal
· Fire box and burglar alarm box · Other safety equipment, etc.]
 - (3) Please don't use for the uses mentioned below which require extremely high reliability
 - [· Space equipment · Telecommunication equipment (Trunk)
· Nuclear control equipment · Medical equipment (relating to any fatal element), etc.]

CUSTOMER'S APPROVAL

DATE _____

BY _____

PRESENTED
BY

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

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1. Application

This specification applies to the outline and characteristics of phototriac coupler Model No. S21ME4 (Apply line voltage 200V AC).

2. Outline

Refer to the attached drawing No. CY5395E02.

3. Ratings and characteristics

3.1 Absolute maximum ratings

Ta=25°C

Parameter		Symbol	Rating	Unit
Input	Forward current	I _F	50	mA
	Reverse voltage	V _R	6	V
Output	On-state current *1	I _T	0.1	Arms
	Peak 1 cycle surge current	I _{surge}	1.2 (50Hz sine wave)	A
	Repetitive peak off-state voltage	V _{DRM}	600	V
Operating temperature		T _{opr}	-30 ~ +100	°C
Storage temperature		T _{stg}	-55 ~ +125	°C
Isolation voltage *2		V _{iso}	5	kVrms
Soldering temperature		T _{sol}	260 (10 sec.)	°C

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

*2 AC for 1 min., 40 ~ 60%RH, f=60Hz

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3.2 Electrical characteristics

Ta=25°C

Parameter		Symbol	MIN.	TYP.	MAX.	Unit	Conditions
Input	Forward voltage	V _F	-	1.2	1.4	V	I _F =20mA
	Reverse current	I _R	-	-	10 ⁻⁵	A	V _R =3V
Output	Repetitive peak off-state current	I _{DRM}	-	-	10 ⁻⁶	A	V _{DRM} =Rated
	On-state voltage	V _T	-	1.7	3.0	V	I _T =0.1A
	Holding current	I _H	0.05	-	3.5	mA	V _D =6V
	Critical rate rise of off-state voltage	dv/dt	100	-	-	V/μS	V _{DRM} =1/√2·Rated
	Zero-cross voltage	V _{ox}	-	-	35	V	I _F =15mA, R load
Transfer characteristics	Minimum trigger current	I _{FT}	-	-	7.0	mA	V _D =6V, R _L =100Ω
	Isolation resistance	R _{iso}	5×10 ¹⁰	10 ¹¹	-	Ω	DC500V RH40~60%
	Turn on time	t _{ON}	-	-	1/2	cycle	f=50, 60Hz
	Turn off time	t _{OFF}	-	-	1/2	cycle	f=50, 60Hz

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4. Reliability

Refer to the attached sheet, Page 7.

5. Incoming inspection

Refer to the attached sheet, Page 8.

6. Supplements

6.1 Isolation voltage shall be measured in the following method.

- (1) Short between pin 1 and 3 on the primary side and between pin 4 and 6 on the secondary side.
- (2) The dielectric withstand tester with zero-cross circuit shall be used.
- (3) The waveform 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

Delivery	Business dealing name	Remarks
	S21ME4F	
	S21ME4FY	Applied to products as a option (Attached sheet 2-1 to 2-4)

6.3 This Model is approved by UL.

Approved Model No. : S21ME4

UL file No. : E64380

6.4 This product is approved by BSI. (BS415)

Approved Model No. : S21ME4

Certificate No. : 6690

6.5 This product is not designed as radiation hardened.

This product is assembled with electrical input and output.

This product incorporates non coherent light emitting diode.

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7. Notes

7.1 Cleaning conditions

- (1) Solvent cleaning: Solvent temperature 45°C or less
Immersion 3 min. or less
- (2) Ultrasonic cleaning: Affection to device by ultrasonic cleaning has different affection by cleaning bath size, ultrasonic power output, cleaning time, PWB size or device mounting condition etc. If user carries out ultrasonic cleaning, user should select fit condition that doesn't occur defect.

* The cleaning shall be carried out with solvent below.

Solvent: Ethyl alcohol, Methyl alcohol, Freon TE·TF
Daiflon-solvent S3-E

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

7.2 Usage : For triggering medium and power triac.

(This model shall be used in the ON condition of triggering power triac)

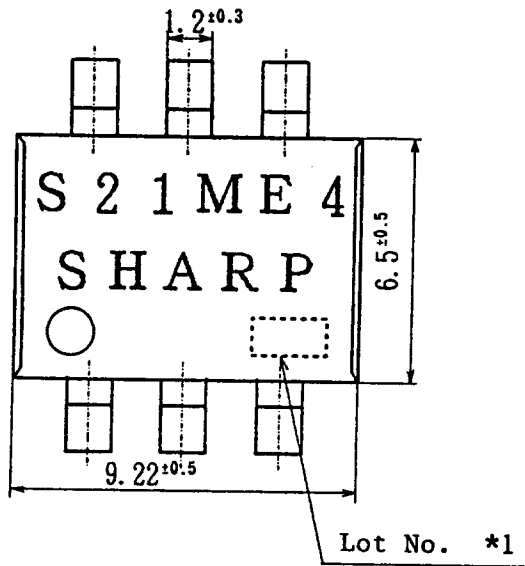
- 7.3 If the voltage exceeding the repetitive peak off-state voltage (VDRM) in the absolute maximum ratings is applied to the phototriac, it may cause not only faulty operation but breakdown. Make sure that the surge voltage exceeding VDRM shall not be applied by using the varistor, CR.

7.4 Precautions for Soldering Photocouplers

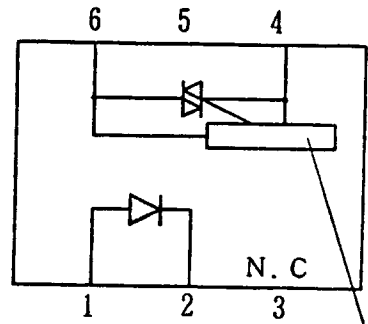
Refer to the attached sheet-1.

8. Others

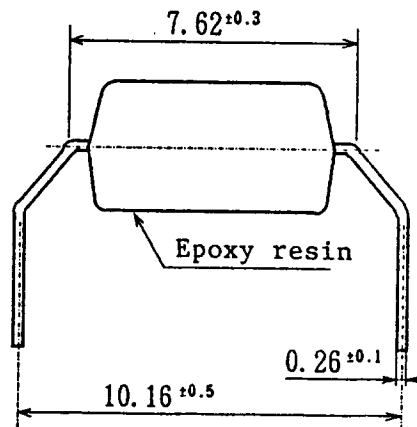
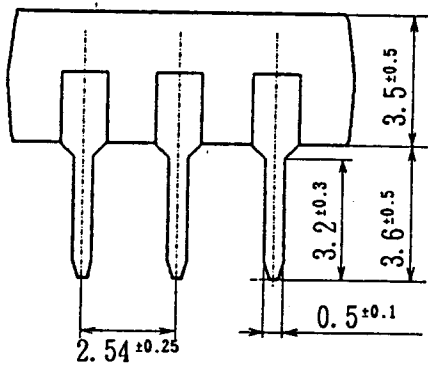
Any doubt as to this specification shall be determined in good faith upon mutual consultation of the both parties.



Pin Nos. and internal connection diagram



Zero-cross circuit

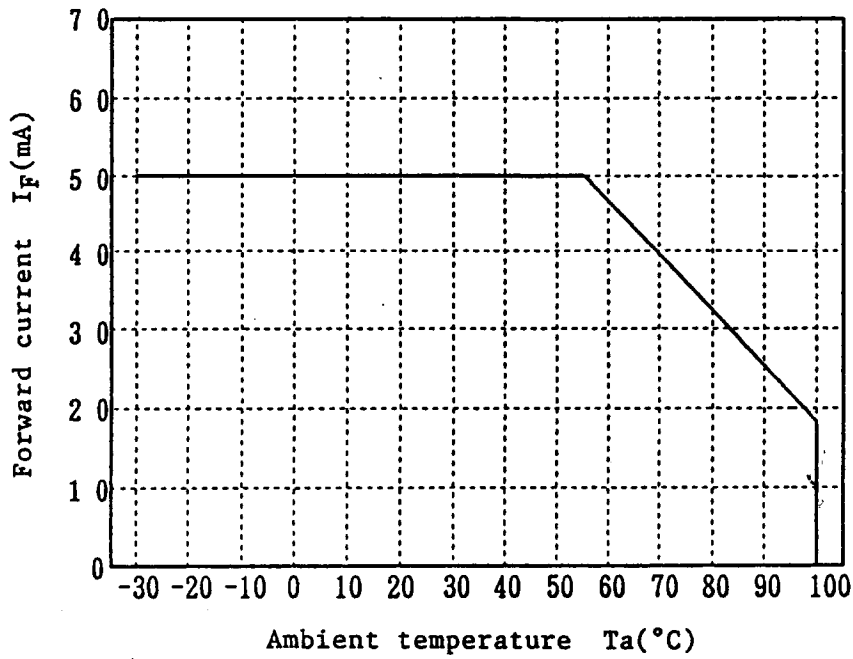
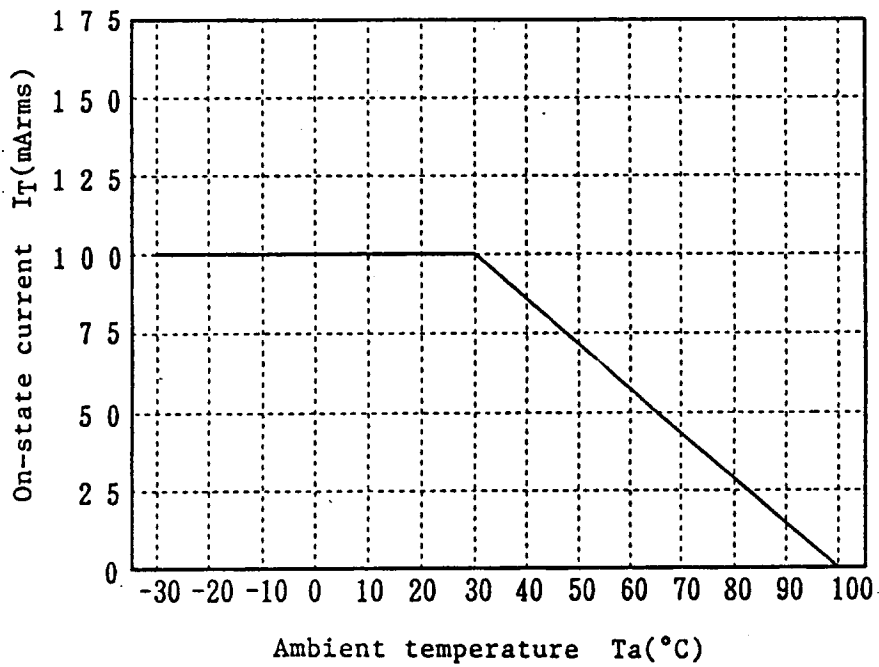


*1 2-digit number marked according to DIN standard.

Note) Pin 5 does not allow external wiring.

UNIT : 1 / 1 mm	
Name	S21ME4 Outline Dimensions
Drawing No.	CY5395E02

Fig. 1 Forward current vs. ambient temperature

Fig. 2 On-state current I_T (mA rms) vs. ambient temperature

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4. Reliability

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

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

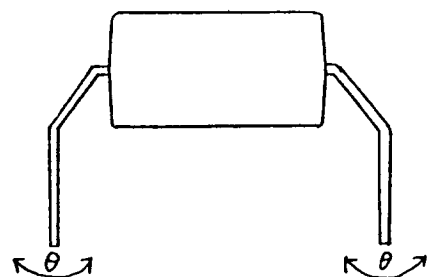
Test Items	Test conditions *1	Failure Judgement Criteria	Samples (n)
			Defective(C)
Solderability *2	230°C, 5 sec.		n=11, C=0
Soldering heat *3	260°C, 10 sec.		n=11, C=0
Terminal strength (Tension)	Weight : 500g 5 sec./each terminal	$V_F > \dot{U} \times 1.2$ $V_T > U \times 1.2$ $I_{FT} > U \times 1.3$ $I_R > U \times 2.0$ $I_{DRM} > U \times 2.0$ U: Upper specification limit	n=11, C=0
Terminal strength (Bending) *4	Weight : 250g 2 times/each terminal		n=11, C=0
Mechanical shock	1500G, 0.5ms. 3 times/ $\pm X, \pm Y, \pm Z$ direction		n=11, C=0
Variable frequency vibration	100 ~ 2000 ~ 100 Hz/4 min. 20G, 4 times/ X, Y, Z direction		n=11, C=0
Temperature cycling	1 cycle -55°C ~ +125°C (30min.) (30min.) 20 cycle test, Without Load		n=22, C=0
High temp. and high humidity storage	+60°C, 90%RH, 1000h		n=22, C=0
High temp. storage	+125°C, 1000h		n=22, C=0
Low temp. storage	-55°C, 1000h		n=22, C=0
Operation life	Ta=25°C, I _F =50mA I _T =100mA, 1000h		n=22, C=0

*1 For details, 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 Dip into the position of 1.0mm from the resin part.

*4 Terminal bending direction is shown below.



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5. Incoming inspection

5.1 Inspection items

(1) Electrical characteristics

V_F, I_R, I_{DRM}, V_T, I_{FT}, R_{iso}, V_{iso}

(2) Appearance

5.2 Sampling method and Inspection level

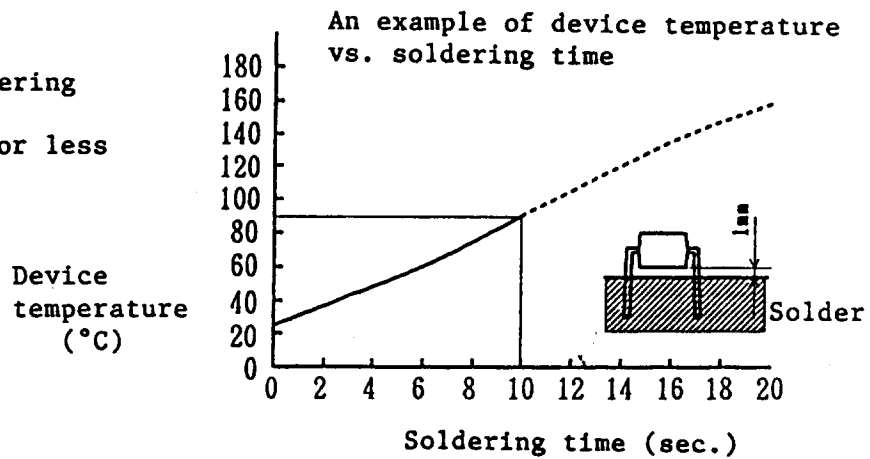
A single sampling plan, normal inspection level II based on MIL-STD-105D is applied. The AQL according to the inspection items are shown below.

Defect	Inspection item	Inspection level	AQL(%)
Major defect	Electrical characteristics Unreadable marking	Normal inspection II	0.1
Minor defect	Appearance Dimension	Normal inspection II	0.4

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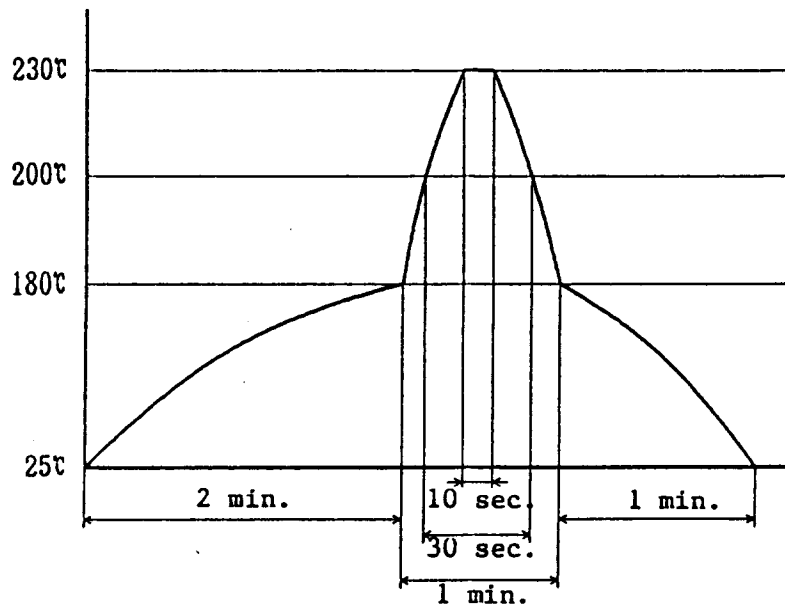
Precautions for Soldering Photocouplers

- In case of soldering to lead
260°C, 10 sec. or less



- 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.



- 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.

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1. This specification shall be applied to photocoupler, Model No. S21ME4 series as a option.
2. Applicable Models (Business dealing names) : S21ME4FY
3. The relevant models are the models Approved by VDE Rheinland Japan according to DIN VDE0884/08.87.

Approved Model No. : S21ME4

VDE approved No. : 68328

(According to the specification, DIN VDE0884/08.87)

Operating isolation voltage U_{IORM} : 890V (Peak)

Transient voltage U_{TR} : 6000V (Peak)

Pollution : 2 (According to VDE0110/01.89)

Clearances distance (Between input and output) : 8.0mm (MIN.)

Creepage distance (Between input and output) : 8.0mm (MIN.)

Isolation thickness between input and output : 0.5mm (MIN.)


Traking-proof : CTI 175 (Material group IIIa: VDE0110/01.89)

Safety limit values Current (I_{si}): 200mA (Diode side)

Power (P_{si}): 400mW (Phototransistor side)

Temperature (T_{si}): 150°C

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

Indication of VDE approval prints "  0884" on sleeve package.

4. Outline

Refer to the attached drawing No. CY5403E02.

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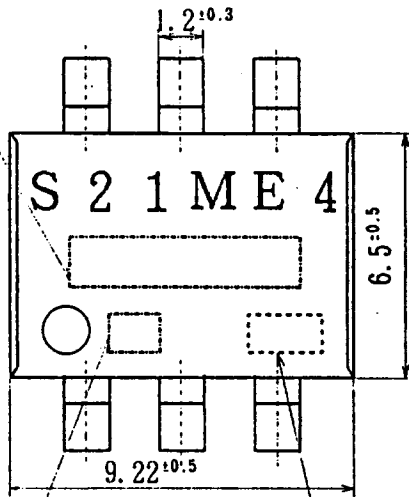
5. Isolation specification according to VDE 0884

Parameter	Symbol	Conditions	Rating	Unit	Remark
Class of environmental test	-	DIN IEC68	30/100/21	-	
Pollution	-	DIN VDE0110	2	-	
Maximum operating isolation voltage	U_{IORM}	-	890	V_{PEAK}	
Partial discharge test voltage (Between input and output)	Diagram 1	$t_p=60s, q_c<5pC$	1068	V_{PEAK}	Refer to the Diagram 1, 2
	Diagram 2	$t_p=1s, q_c<5pC$	1424	V_{PEAK}	
Maximum over-voltage	$U_{INITIAL}$	$t_{INI}=10s$	6000	V_{PEAK}	
Safety maximum ratings					
1) Case temperature	T_{si}	$I_f=0, P_c=0$	150	$^{\circ}C$	Refer to Fig.1, 2 (Attach sheet2-4)
2) Input current	I_{si}	$P_c=0$	200	mA	
3) Electric power (output or All electric power dissipation)	P_{si}	-	400	mW	
Isolation resistance (Test voltage between input and output; DC500V)	R_{iso}	$T_a=T_{si}$	MIN. 10^9	Ω	
		$T_a=T_{opr}(MAX)$	MIN. 10^{11}		
		$T_a=25^{\circ}C$	MIN. 10^{12}		

6. Precautions in performing insulation 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 (V_{iso}) 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}).

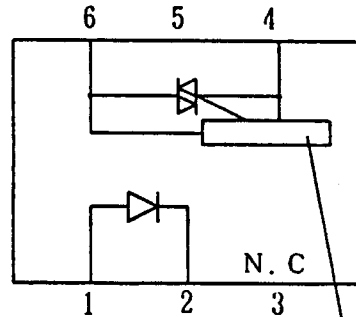
"S" or "SHARP"



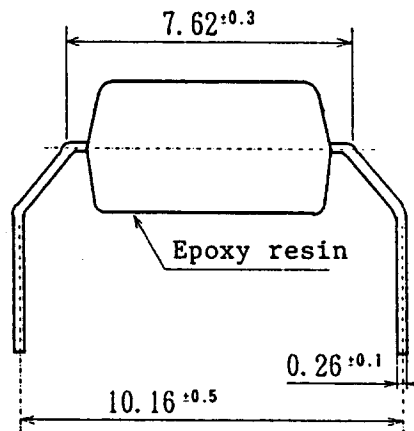
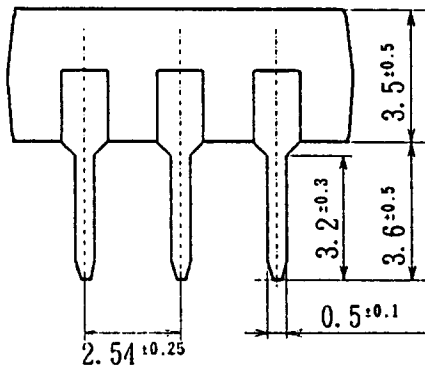
Lot No. *1



Pin Nos. and internal connection diagram



Zero-cross circuit



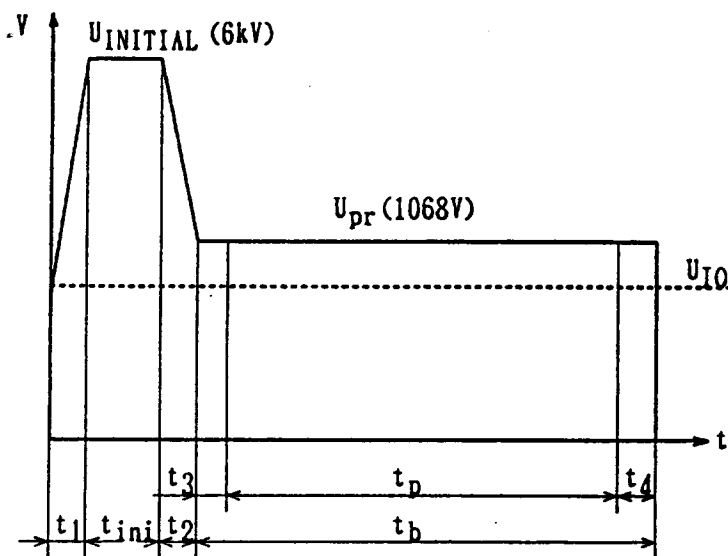
*1 2-digit number marked according to DIN standard.

Note) Pin 5 does not allow external wiring.

UNIT : 1 / 1 mm

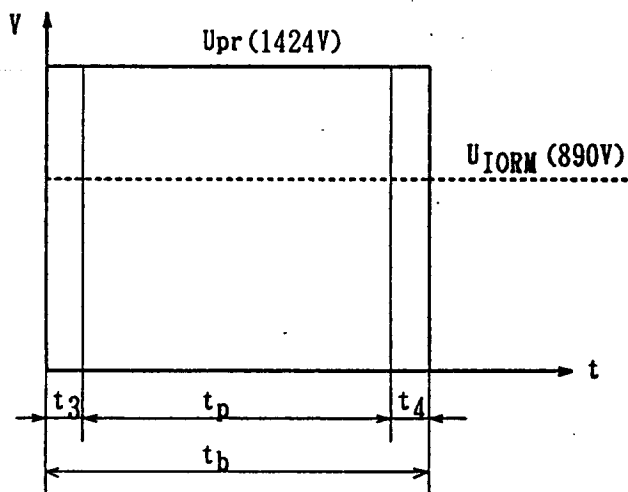
Name	S21ME4 (Business dealing name: S21ME4FY) Outline Dimensions
Drawing No.	CY5403E02

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)

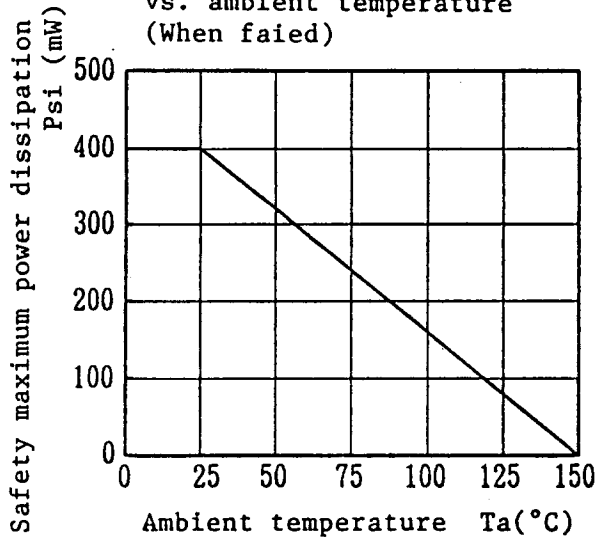


Fig. 7 Safety maximum forward current vs. ambient temperature (When failed)

