PC3SD12NTZBF
PC3SD12YTZBF

V_{DRM} : 600V, Cost effective
Non-zero cross type
DIP 6pin
Phototriac Coupler for triggering

■Description

PC3SD12NTZBF Phototriac Coupler include an infrared emitting diode (IRED) optically coupled to an output Phototriac.
These devices feature full wave control and are ideal isolated drivers for medium to high current Triacs.
DIP package provides 5.0kV isolation from input to output with superior commutative noise immunity.

■Features

1. High repetitive peak off-state voltage (V_{DRM} : 600V)
2. Non zero crossing functionality
3. 6 pin DIP package
4. Superior noise immunity (dV/dt : MIN.1000V/μs)
5. Double transfer mold construction
   (Ideal for Flow Soldering)
6. High isolation voltage between input and output
   (Viso(rms) : 5.0kV)

■Agency approvals/Compliance

1. Recognized by UL1577 (Double protection isolation), file No. E64380 (as model No. **3SD12**)
2. Approved by CSA, file No. CA95323
   (as model No. **3SD12**)
3. Optionary available VDE Approved(*)
   (DIN EN 60747-5-5), file No. 40008189
   (as model No. **3SD12**)
4. Package resin : UL flammability grade (94V-0)

(*) DIN EN60747-5-5 : successor standard of DIN EN60747-5-2
UP to Date code “S1” (January 2004), approval of DIN EN60747-5-2.
From Date code “E4” (April 2014), approval of DIN EN60747-5-5

■Applications

1. Triggering for Triacs used to switch on and off devices which require AC loads.
   For example heaters, fans, motors, solenoids, and valves.
2. Triggering for Triacs used for implementing phase control in applications such as lighting control and temperature control (HVAC).
3. AC line control in power supply applications.

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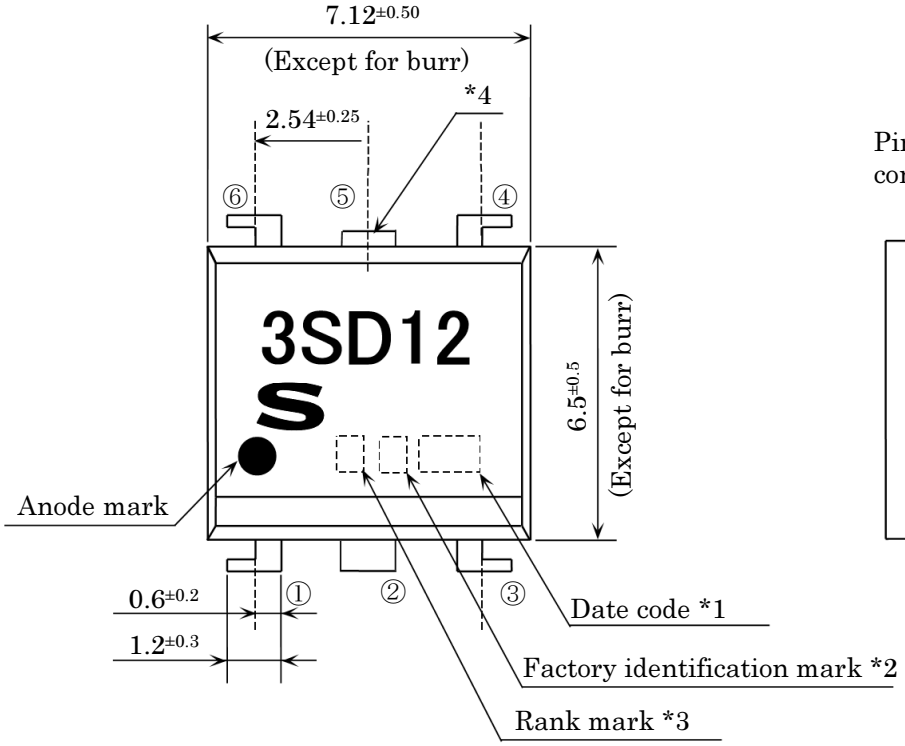
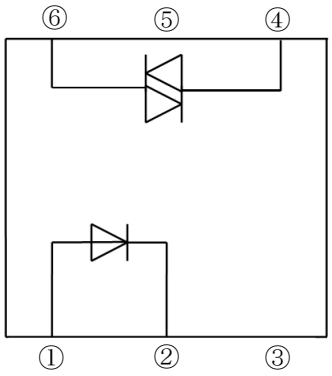
Sheet No.: OP14015EN

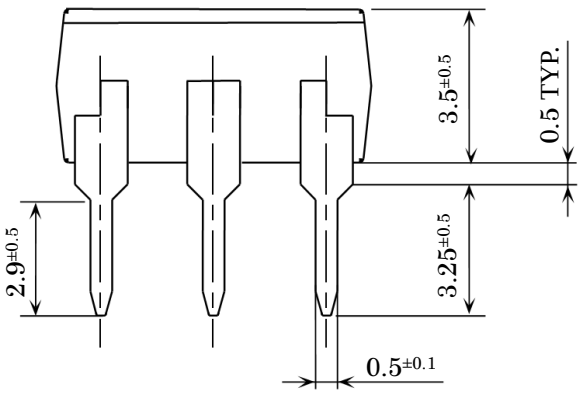
■Outline

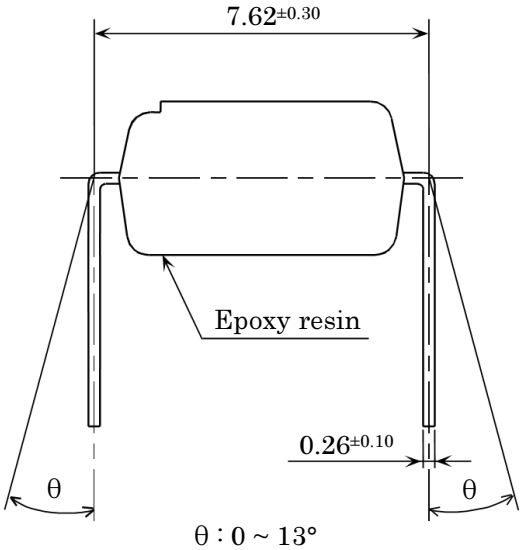


Pin-Number and internal connection diagram



①Anode
②Cathode
③NC
④Anode/ Cathode
⑤No external connection
⑥Anode/ Cathode





θ : 0 ~ 13°

*1) 2-digit number shall be marked according to OLD DIN standard.
*2) Factory identification mark applies to the below.
Without : SUN-S Corporation (Japan)
▽ : SUN-S Electronic Technology (KUNSHAN) Co. Ltd (China)
*3) Rank mark : "B"
*4) Pin 5 is cut at outside of package.
*5) Pin material : Copper Alloy
Pin finish : SnCu plating (Cu : TYP. 2%)

Product mass : Approx.0.35g

Unit : 1/1mm	
Name	3SD12 Outline Dimensions (Business dealing name : PC3SD12NTZBF)

■Absolute maximum ratings

Ta=25°C

Parameter		Symbol	Rating	Unit
Input	Forward current *1	I_F	50	mA
	Reverse voltage	V_R	6	V
Output	RMS on-state current *1	I_T(rms)	0.1	A
	Peak one cycle surge current	Isurge	1.2 (50Hz sine wave)	A
	Repetitive peak off-state voltage	V_{DRM}	600	V
Isolation voltage *2		Viso(rms)	5	kV
Operating temperature		Topr	-30 to +100	°C
Storage temperature		Tstg	-55 to +125	°C
Soldering temperature		Tsol	270 (For 10s)	°C

*1 The derating factors of absolute maximum rating due to ambient temperature are shown in Fig.1, 2.
*2 AC for 1min, 40 to 60%RH, f=60Hz

■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_D=V_{DRM}
	On-state voltage	V_T	-	-	2.5	V	I_T=0.1A
	Holding current	I_H	0.1	-	3.5	mA	V_D=6V
	Critical rate of rise of off-state voltage	dv/dt	1000	2000	-	V/μs	V_D=1/√2・V_{DRM}
Transfer charac-teristic	Minimum trigger current	I_{FT}	-	-	7	mA	V_D=6V, R_L=100Ω
	Isolation resistance	R_{ISO}	5×10^{10}	10^{11}	-	Ω	DC500V 40 to 60%RH
	Turn on time	t_{ON}	-	-	50	μs	V_D=6V, R_L=100Ω, I_F=20mA

Fig.1 Forward current vs. ambient temperature

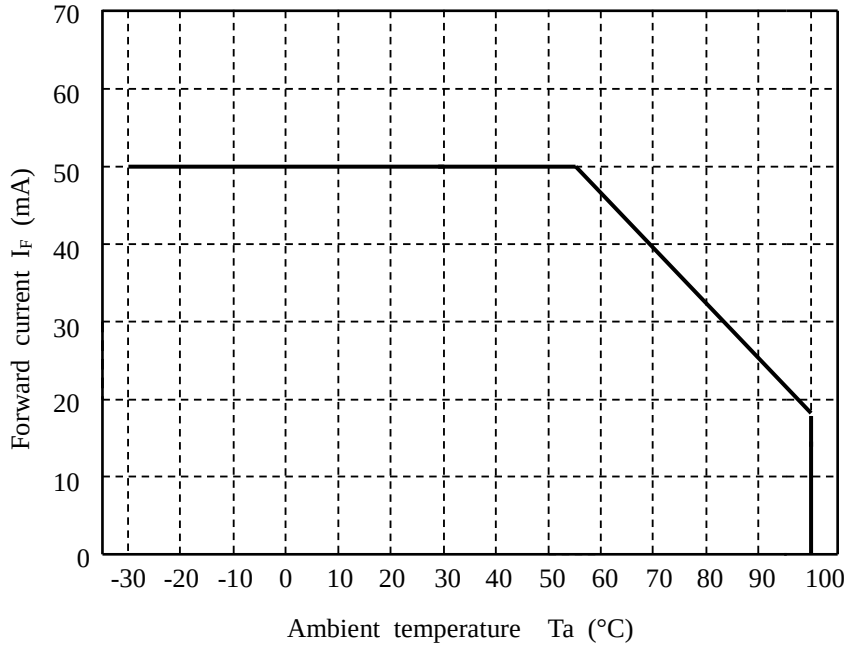
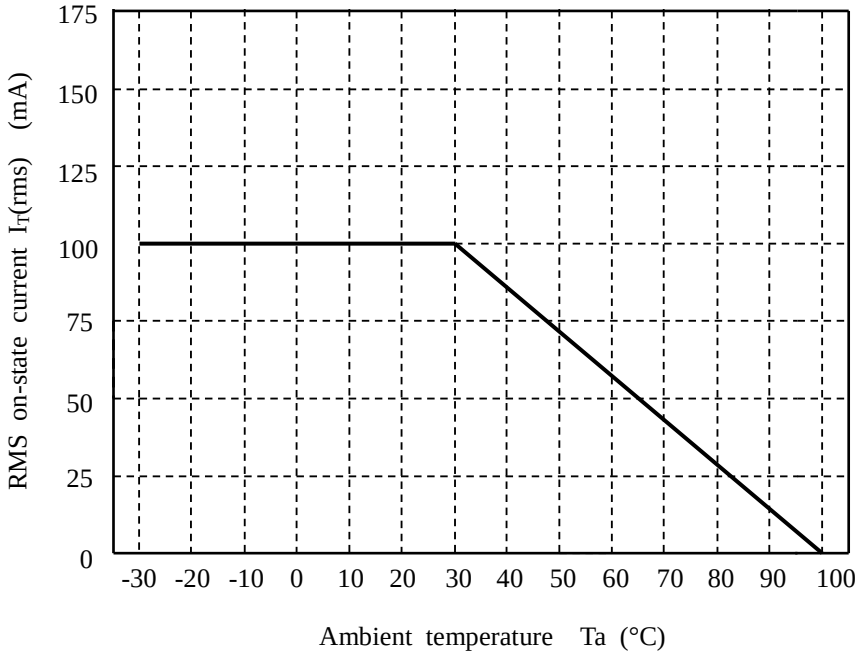


Fig.2 RMS on-state current vs. ambient temperature



■Supplements

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

Product	Business dealing name	Remarks
	PC3SD12NTZBF	
	PC3SD12YTZBF	* Applied to products as an option (Attachment-1-1 to 1-3)

●Package specification
Refer to the attached sheet, page 7, 8.

●Isolation voltage shall be measured in the following method.
(1) Short between pins 1 to 3 on the primary side and between pins 4 to 6 on the secondary side.
(2) The dielectric withstanding 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.)

●This Model is approved by UL and CSA.
Approved Model No. : 3SD12
UL file No. : E64380
CSA file No. : CA95323
CSA approved mark " " shall be indicated on minimum unit package.

●This product is not designed against irradiation.
This product is assembled with electrical input and output.
This product incorporates non-coherent light emitting diode.

●ODS materials
This product shall not contain the following materials.
Also, the following materials shall not be used in the production process for this product.
Materials for ODS : CFC_S, Halon, Carbon tetrachloride, 1.1.1-Trichloroethane (Methyl chloroform)

●Brominated flame retardants
Specified brominated flame retardants (PBB and PBDE) are not used in this device at all.

■Notes

●Circuit design

(1) The LED used in the Phototriac coupler generally decreases the light emission power by operation. In case of long operation time, please decide I_F value so that I_F is twice or more of the Maximum value of the Minimum triggering current at circuit design with considering the decreases of the light emission power of the LED. (50% / 5years)

(2) Input current (I_F) at off state shall be set 0.1mA or less.

(3) In case that pulse drive is carried out, the pulse width of input signal should be 1ms or more.

●Usage

Only for triggering medium power triac and high power triac.
(This model shall be used under the conditions on which power triac turns on.)

●Cleaning

(1) Solvent cleaning : Solvent temperature 45°C or less, Immersion for 3 min or less

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

(3) Applicable solvent : Ethyl alcohol, Methyl alcohol, Isopropyl alcohol
When the other solvent is used, there are cases that the packaging resin is eroded.
Please use the other solvent after thorough confirmation is performed in actual using condition.

●Precautions for Soldering Phototriac couplers

(1) In case of flow solder (Whole dipping is possible)
It is recommended that flow soldering be carried out at 270°C or less and within 10s
(Pre-heating : 100 to 150°C, 30 to 80s) : Within 2 times

(2) It is recommended that hand soldering be carried out at 400°C or less and within 3s: Within 2 times

(3) Other notes
Depending on equipment and soldering conditions (temperature, Using solder etc.), the effect to junction between PCB and lead pins of photocoupler is different.
Please confirm that there is no problem on the actual use conditions.

■Package specification

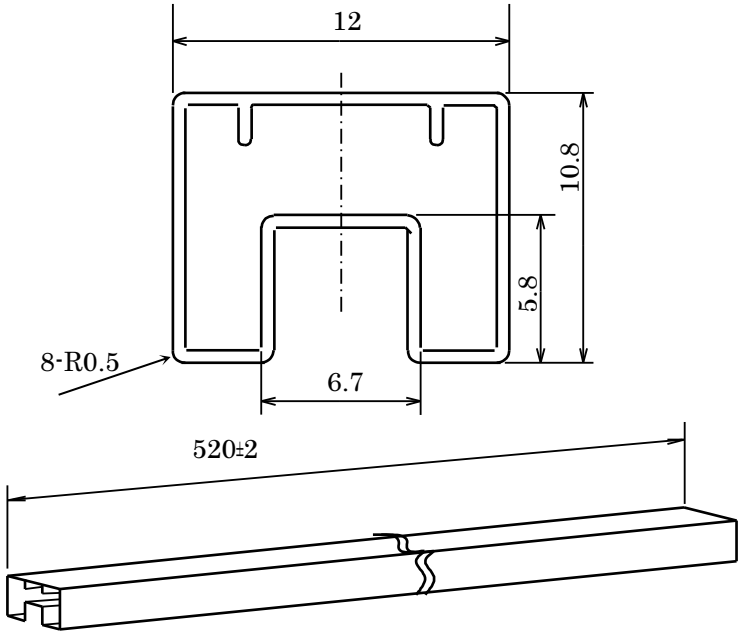
●Package materials

No.	Name	Materials	Purposes
1	Sleeve	HIPS with preventing static electricity	Products packaged
2	Stopper	Styrene-Elastomer	Products fixed
3	Packing case	Corrugated cardboard	Sleeve packaged
4	Kraft tape	Paper	Lid of packaged case fixed
5	Label	Paper	Model No.(Business dealing name), lot No. , quantity , country of origin , Company name and inspection date specified

●Package method

(1) MAX. 50pcs. of products shall be packaged in a sleeve and both of sleeve edges shall be fixed by stoppers.
(2) MAX. 20 sleeves above shall be packaged in a packing case and pack a sheet of cushion at one side.
(3) The label shall be put on the side of the packaging case.
(4) Case shall be closed with the lid and enclosed with kraft tape.

●Sleeve drawing

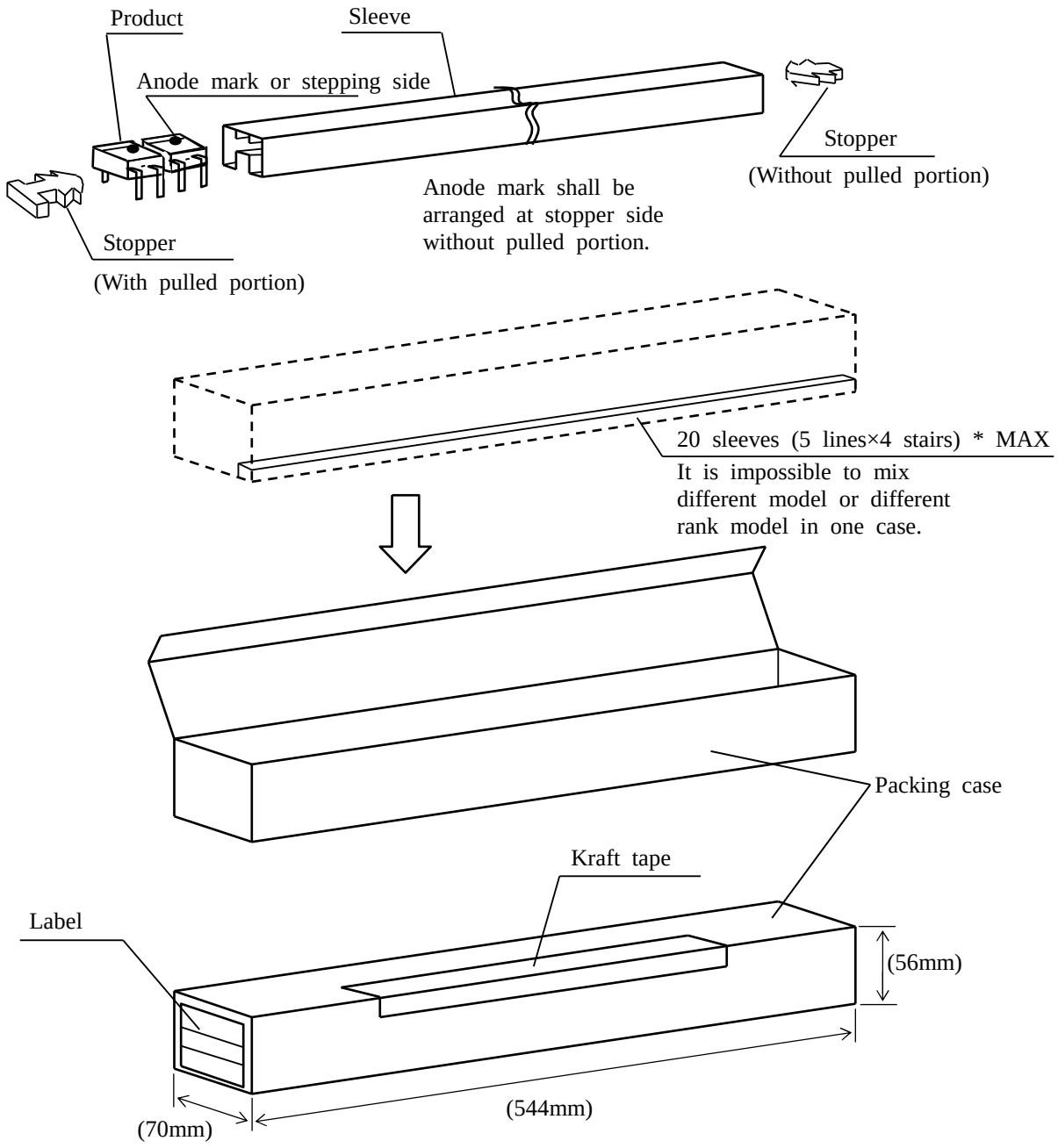


(Unit : mm)

Length : L=520 ± 2mm

Note 1) Thickness : 0.5±0.2mm
2) Process with applying antistatic treatment.
3) Unless otherwise specified tolerances shall be ±0.5mm.
(However except for deformation due to the rubber stopper in sleeve.)

●Packing case outline dimensions



Regular packing mass : Approx. 760g

( ) : Reference dimensions

(Attachment-1-1)

1. This specification shall be applied to photocoupler, Model No. 3SD12 series as an option.
2. Applicable Models (Business dealing name)
   PC3SD12YTZBF
3. The relevant models are the models Approved by VDE according to DIN EN 60747-5-2.
   Up to date code “RD” (December 2003), the relevant models are approved by VDE according to DIN VDE 0884/08.87.
   Approved Model No. : 3SD12
   VDE approved No. : 40008189 (According to the specification DIN EN 60747-5-2)
   - Operating isolation voltage U_{IORM} : 890V $_{(Peak)}$
   - Transient voltage : 9000V$_{(Peak)}$
   - Pollution : 2
   - Clearances distance (Between input and output) : 6.4mm (MIN.)
   - Creepage distance (Between input and output) : 6.4mm (MIN.)
   - Isolation thickness between input and output : 0.15mm (MIN.)
   - Tracking-proof : CTI 175
   - Safety limit values Current (Isi) : 200mA (Diode side)
     Power (Psi) : 400mW (Phototransistor side)
     Temperature (Tsi) : 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 " V DE " is printed on the minimum packing box.

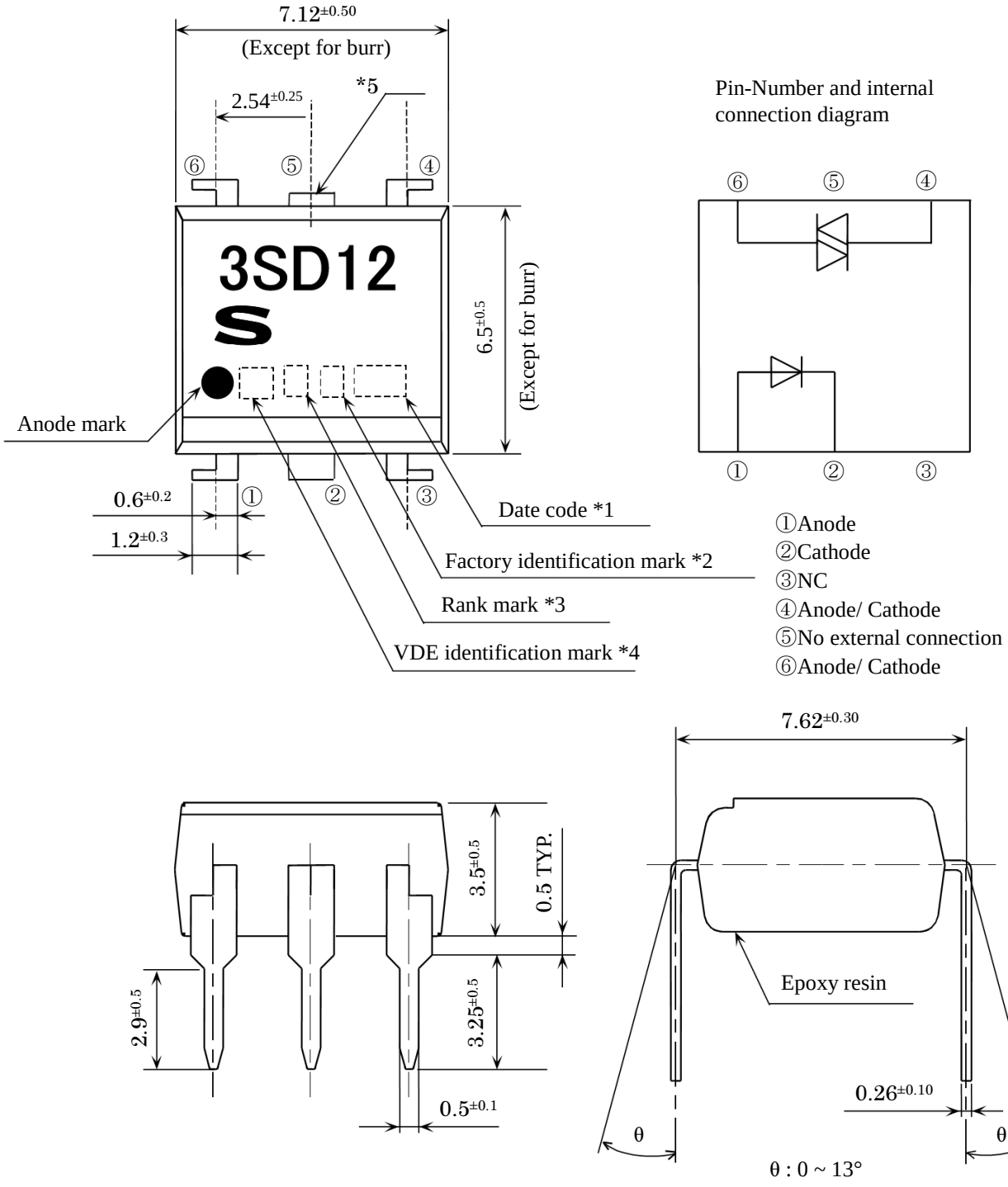
4. Outline
   Refer to the attachment-1-2.

5. Isolation specification according to EN 60747-5-2.

Parameter	Symbol	Conditions	Rating	Unit	Remark
Class of environmental test	-	-	40/100/21	-	Refer to the Diagram 1, 2 (Attachment -1-3)
Pollution	-	-	2	-	
Maximum operating isolation voltage	$U_{IORM(PEAK)}$	-	890	V	
Partial discharge test voltage (Between input and output)					
Diagram 1	$Upr_{(PEAK)}$	tp=10 s, qc＜5pC	1340	V	
Diagram 2		tp=1 s, qc＜5pC	1670	V	
Maximum over-voltage	$U_{IOTM\ (PEAK)}$	t_{INI}=60 s	9000	V	
Safety maximum ratings					Refer to Fig.1, 2 (Attachment -1-3)
1) Case temperature	Tsi	I_F=0, Pc=0	150	°C	
2) Input current	Isi	Pc=0	200	mA	
3) Electric power (Output or Total power dissipation)	Psi	-	400	mW	
Isolation resistance (Test voltage between input and output ; DC 500V)	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 EN 60747-5-2
6.2 Please don't carry out isolation test (V_{iso}) over U_{IOTM}. This product deteriorates isolation characteristics by partial discharge due to applying high voltage (ex. U_{IOTM}).
   And there is possibility that partial discharge occurs in operating isolation voltage. (U_{IORM}).

(Attachment-1-2)



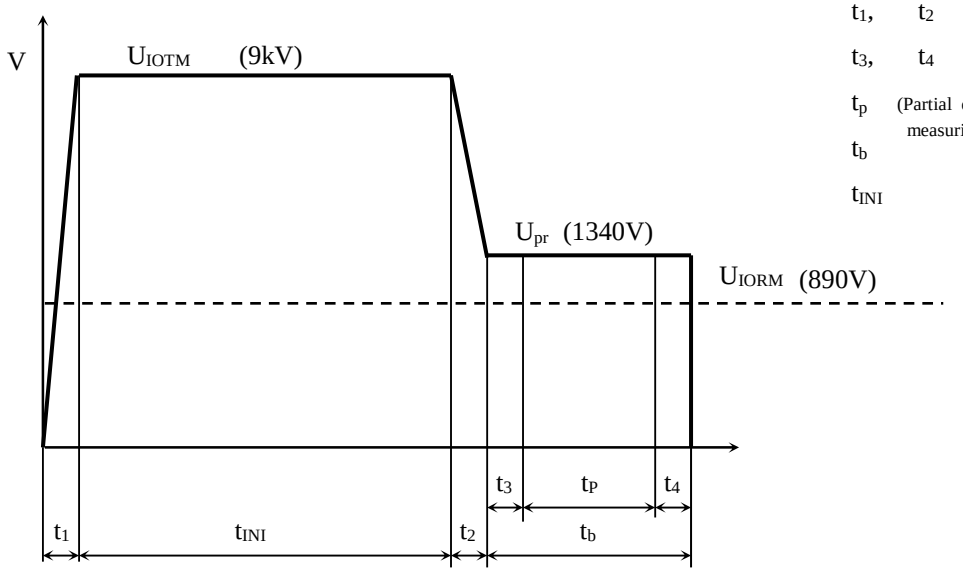
*1) 2-digit number shall be marked according to OLD DIN standard.
*2) Factory identification mark applies to the below.
Without : SUN-S Corporation(Japan)
: SUN-S Electronic Technology (KUNSHAN) Co. Ltd （China）
*3) Rank mark : "B"
*4) VDE identification mark shall be marked "4".
*5) Pin 5 is cut at outside of package.
*6) Pin material : Copper Alloy
Pin finish : SnCu plating (Cu : TYP. 2%)

Product mass : Approx.0.35g

UNIT : 1/1 mm	
Name	3SD12 Outline Dimensions (Business dealing name : PC3SD12YTZBF)

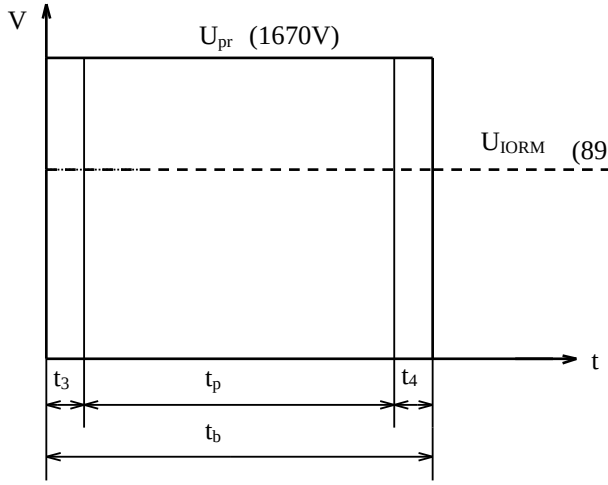
(Attachment-1-3)

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)	= 10 s
t_b		= 12 s
t_{INI}		= 60 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.1 Safety maximum power dissipation vs. ambient temperature (When failed)

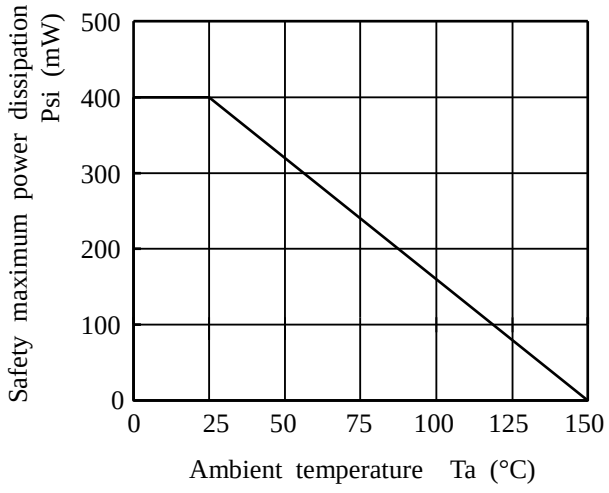
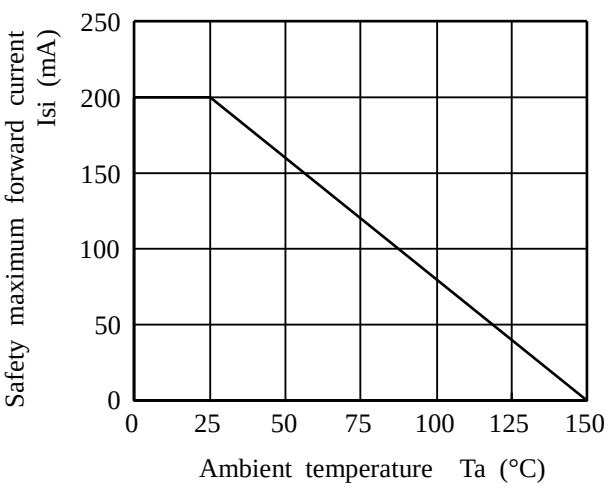


Fig. 2 Safety maximum forward current vs. ambient temperature (When failed)



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--- Office automation equipment
--- Telecommunication equipment [terminal]
--- Test and measurement equipment
--- Industrial control
--- Audio visual equipment
--- Consumer electronics
(ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection with equipment that requires higher reliability such as:
--- Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
--- Traffic signals
--- Gas leakage sensor breakers
--- Alarm equipment
--- Various safety devices, etc.
(iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:
--- Space applications
--- Telecommunication equipment [trunk lines]
--- Nuclear power control equipment
--- Medical and other life support equipment (e.g., scuba).

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