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# SHARP

ELECTRONIC COMPONENTS  
GROUP SHARP CORPORATION

## SPECIFICATION

SPEC No. ED-94097

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PAGE 8 Pages

REPRESENTATIVE DIVISION

OPTO-ELECTRONIC  
DEVICES DIV.

DEVICE SPECIFICATION FOR

### SOLID STATE RELAY

MODEL No.

S202T02

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2. Please obey the instructions mentioned below for actual use of this device.

SHARP takes no responsibility for damage caused by improper use of the devices.

(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.)
- Traffic signal • Gas leak detection breaker • Fire box and burglar alarm box
- Other safety equipment, etc.

(3) Please do not use for the uses mentioned below which require extremely high reliability.

- Space equipment • Telecommunication equipment (Trunk)
- Nuclear control equipment • Medical equipment etc.

Contact a SHARP representative of sales office in advance when you intend to use SHARP devices for any applications other than those applications for general electronic equipment recommend by SHARP at (1).

CUSTOMERS APPROVAL

DATE

BY

DATE  
PRESENTED  
BY

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## 1. Application

This specification applies to the outline and characteristics of SIP type Solid State Relay (SSR), Model No. S202T02 (Apply line voltage 200V to 265V AC).

## 2. Outline

2.1 Refer to the attached drawing No. S3D94030.

2.2 (1) Trade mark (2) Model No. and (3) Lot symbol shall be indicated on the surface.

## 3. Ratings and characteristics : Refer to the attached sheet, Page 3 to 5.

3.1 Absolute **maximum** ratings

3.2 **Electrical** characteristics

## 4. Reliability

Refer to the attached sheet, Page 6, 7.

## 5. Incoming inspection

Refer to the attached sheet, Page 7.

## 6. Supplements

6.1 UL, CSA under preparation,

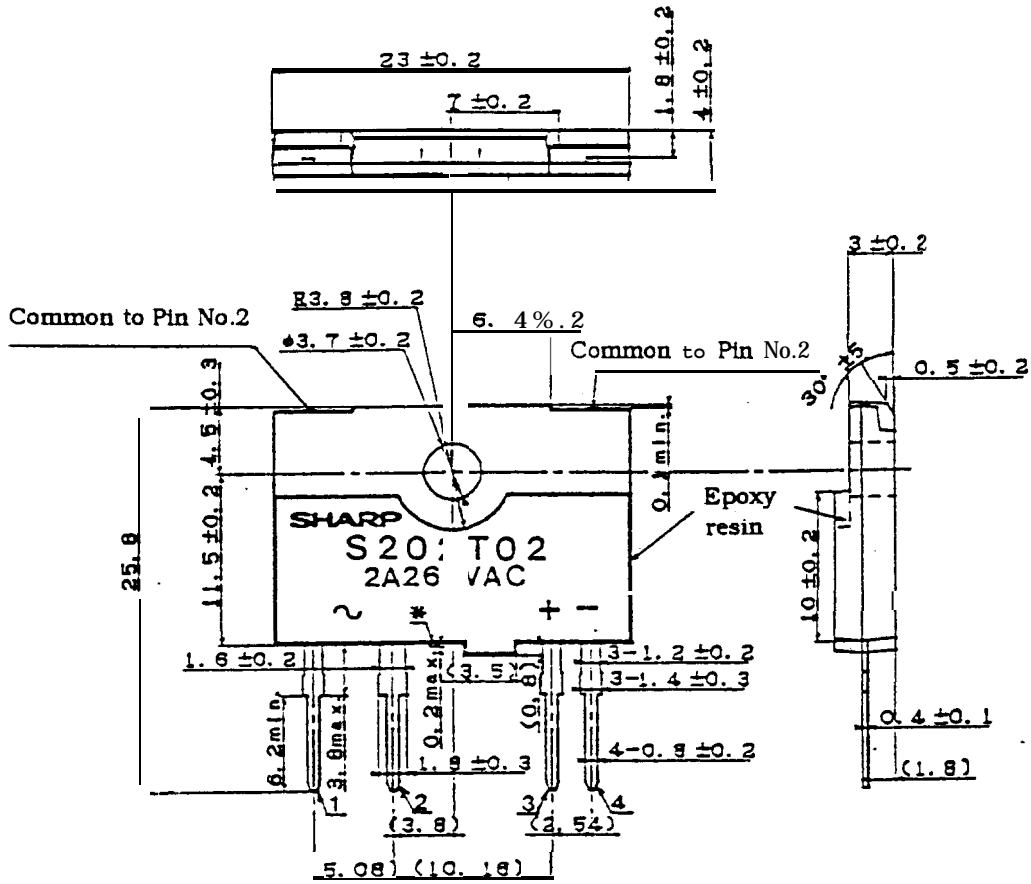
6.2 This product is not designed against irradiation.

This product is assembled with electrical input and output.

This product incorporates non-coherent light emitting diode.

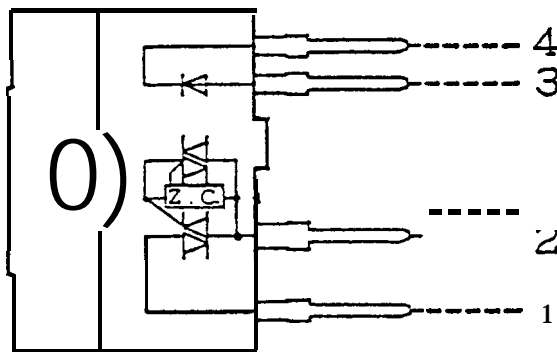
## 7. Notes

Refer to the attached sheet, Page 8.



Pin finish : Solderplating

Pin Nos. and internal connection diagram



Z.C.: Zero-cross circuit

Pin No.	Connect
1	Output (Triac T1)
2	Output (Triac T2)
3	Input (+)
4	Input (-)

1) ※ mark does not allow external wiring.

2) ( ): TYP.

SCALE	UNIT
2/1	1=1/mm
Name	S202T02 Outline Dimensions

Drawing No. S3D94030

## 3.1 Absolute maximum ratings

Ta=25°C

Parameter		Symbol	Rating	Unit	Conditions
Input	Forward current	$I_F$	50	mA	
	Reverse voltage	$V_R$	6	V	
output	<b>RMS</b> on-state current	$I_T$	2	Arms	Refer to the Fig. 1
	Peak one cycle surge current	$I_{\text{surge}}$	20	A	60Hz sine wave Tj=25 °C start
	<b>Repetitive</b> peak off-state voltage	$V_{\text{DRM}}$	600	v	
	Non-repetitive peak off-state voltage	$V_{\text{DSM}}$	600	v	
	<b>Critical rate</b> of rise of on-state current	$dI_T/dt$	40	A/ $\mu$ s	
	Operating frequency	f	45 to 65	Hz	
Operating temperature		Topr	-25 to +100	°C	
Storage temperature		Tstg	-30 to 125	°C	
Isolation voltage (*1)		Viso	3.0	kVrms	AC 60Hz, For 1min. RH=40 to 60%
Soldering temperature		Tsol	260	°C	For 10 seconds

(\*1) Isolation voltage measuring method

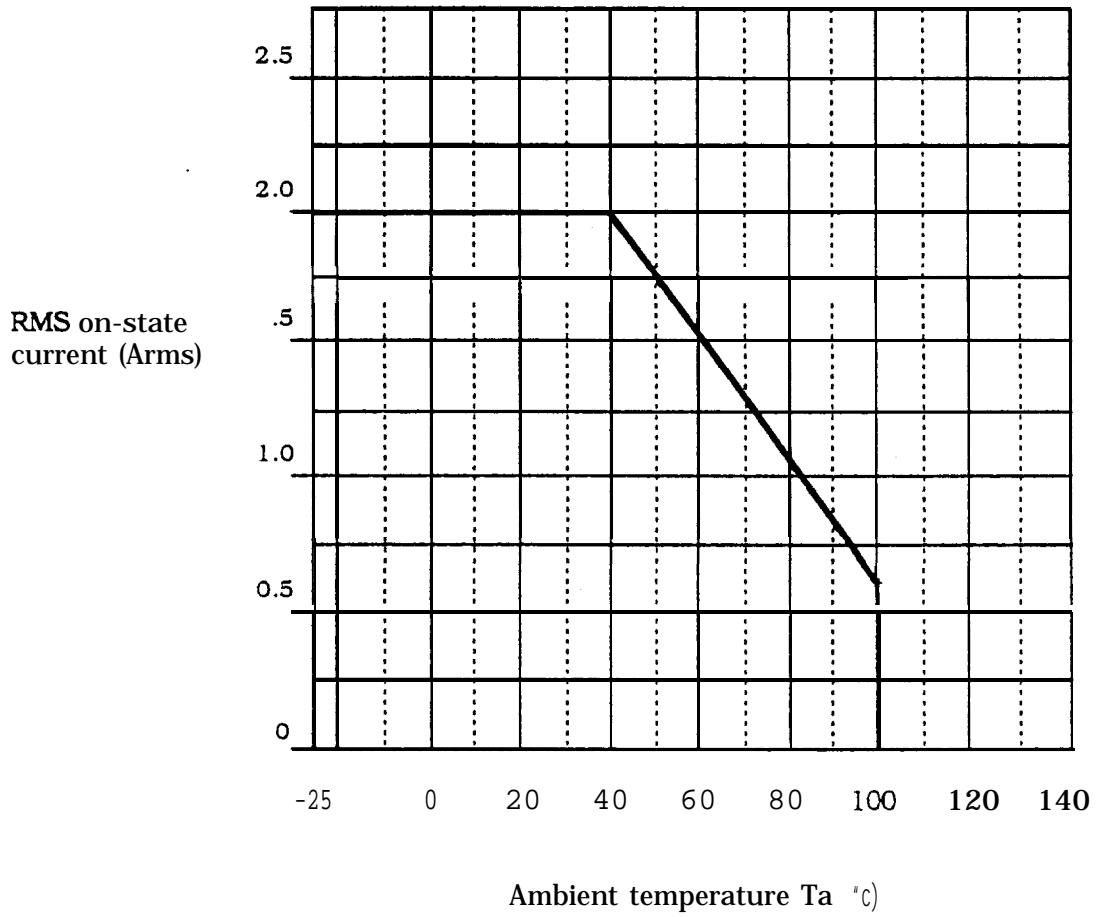
- (1) Dielectric withstand tester, with zero-cross circuit shall be used.
- (2) The wave form of applied voltage shall be sine wave.
- (3) It shall be applied voltage between input and output.  
(Inputs and outputs shall be short-circuited respectively)

## 3.2 Electrical characteristics

Ta=25°C

Parameter		symbol	MIN.	TYP.	MAX.	unit	Conditions
Input	Forward voltage	$V_F$	-	1.2	1.4	v	$I_F=20\text{mA}$
	Reverse current	$I_R$	-	-	$10^{-4}$	A	$V_R=3\text{V}$
output	Repetitive peak off-state current	$I_{\text{DRM}}$			$10^{-4}$	A	$V_D=V_{\text{DRM}}$
	On-state voltage	$V_T$	-	-	1.7	$V_{\text{rms}}$	$I_T=2\text{Arms}$ , R load, $I_F=20\text{mA}$
	Holding current	$I_H$	-	-	25	mA	
	Critical rate of rise of off-state voltage	$dv/dt$	30	-	-	$\text{V}/\mu\text{s}$	$V_D=2/3V_{\text{DRM}}$
	Commutation critical rate of rise of off-state voltage	$(dv/dt)_c$	4	-	-	$\text{V}/\mu\text{s}$	$T_j=125^\circ\text{C}$ , $V_D=400\text{V}$ $dI/dt=-1.0\text{A}/\text{ms}$
Transfer characteristics	Minimum trigger current	$I_{\text{FT}}$	-	-	8	mA	$V_D=6\text{V}$ , $R_L=30\Omega$
	Zero-cross voltage	$V_{\text{OX}}$	-	-	35	v	$I_F=8\text{mA}$
	Isolation resistance	$R_{\text{iso}}$	$10^{10}$	-	-	$\Omega$	DC500V RH=40 to 60%
	Turn on time	$t_{\text{ON}}$			10	ms	AC50Hz
	Turn off time	$t_{\text{OFF}}$			10	ms	AC50Hz

Fig. 1  $T_a$ - $I_T$ (rms) rating



## 4. Reliability

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

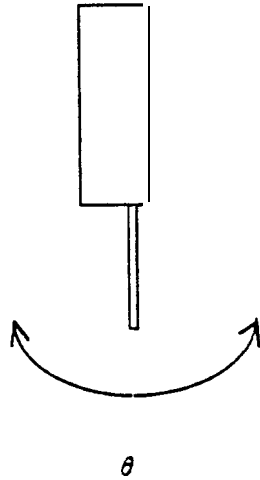
Confidence level: 90%  
LTPD : 10%/20%

Test Items	Test Conditions	Judgement Criteria	Samples (n)
			Defective (C)
Temperature cycling	1 cycle -30°C to 125°C (30min.) (30min.) 20 cycles test	(1) Forward voltage:  I±5% or less	n=22, C=0
High temp. high humidity storage	+60°C, 90%RH, 500h		n=22, C=0
High temp. storage	+125°C, 1000h	USLX2 or less	n=22, C=0
Low temp. storage	-30°C, 1000h	(3) Repetitive peak off-state current:  USLX2 or less	n=22, C=0
Intermittent operation	AC200V, 2Arms, Ta=25±3°C For 1min. ON, OFF, 500h		n=22, C=0
Vibration	200m/s <sup>2</sup> 100 to 2000Hz/4min. 4times /X, Y, Z direction	(4) On-state voltage:  USLX 1.2 or less	n=11, C=0
Terminal strength (Bending)	The first bending test is to put back into the original shape after the terminal bent 90° by a 5N load. The second bending test is to do the same but opposite direction. These two tests shall be performed. ● 1	(5) Minimum trigger current:  USLX 1.2 or less	n=11, C=0
Terminal strength (Tension)	Weight : 10N 30s / terminal direction	(6) Isolation resistance, Isolation voltage:  Within the value Ofspec.	
Soldering heat	260°C, 5s Up to 1.5mm from resin portion ● 2		n=11, C=0
Solderability	230±5°C, 5±0.5s Use rosin flux. ● 2	Solder shall adhere at the area or 95% or more of A portion	n=11, C=0

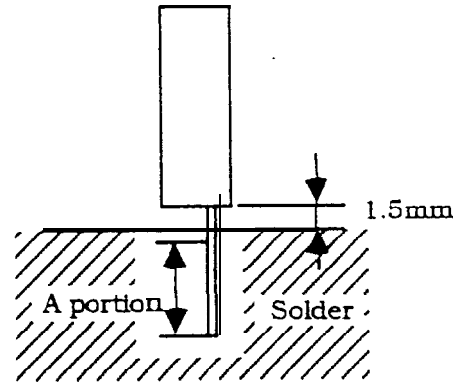
USL : Max. specification values

I : Initial values

- 1 Terminal bending direction is shown below.



- 2 Soldering area is shown below.



A portion : From the lower edge of fiber cut portion to the end of lead

5. Incoming inspection

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 items	AQL (%)	Judgement criteria
Major defect	Electrical characteristics	0.10	Depend on the specification
	Unreadable marking		
Open, short			
Minor defect	Appearance	0.40	
	Dimensions		

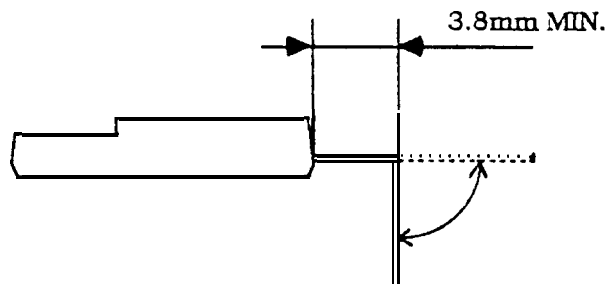
Inspection items of electrical characteristics :

$V_F, I_R, I_{DRM}, V_T, I_H, I_{FT}, V_{OX}, V_{ISO}, R_{ISO}$



## 7. Notes

- (1) The LED chip used in the input side of Solid State Relay generally decreases the light emission power after long operation time. The amount of light emission power decrease depends on the ambient temp. and the applied current. (50%/5years) Please decide  $I_F$  value as 2 times of the Maximum value of the Minimum triggering current at circuit design.
- (2) Please make sure that surge absorption circuit and  $dv/dt$  control circuit are provided for protection of element. In general, we recommend that both CR circuit and varistor be used in conjunction. Watch for faulty operation that may be caused by leakage current that runs through the CR circuit.
- (3) Current value of the load shall be holded within the range of derating curve. Install an optional heat sink as required.
- (4) If it is necessary to bend terminal pins, please bend them 3.8mm or more away from base of terminal pins to prevent mechanical stress between base of terminal pins and resin of mold.



- (5) Some have a built-in rectifier such as diode, etc. as part of the electromagnetic counter or solenoid specified for use on AC. If this is the case, check out properly the wave form of the load current. If it is a rectangular wave as it may become, the SSR will not turn OFF.
- (6) Cleaning conditions:
  - 1) Solvent cleaning: Solvent temperature 45°C or less ,  
Immersion 3min. 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) The cleaning shall be carried out with solvent below.  
Solvent: Ethyl alcohol, Methyl alcohol, Isopropyl alcohol  
Freon TE • TF, Daiflon-solvent S3-E, S3-MC

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