THE DATASHEET OF

S202TA1

PREPARED BY:	DATE:		SPEC No.	ED-94045D
S. Fujiwara	Oct. 27. '95	SHARP	ISSUE	October 25, 1995
APPROVED BY:	DATE:		PAGE	10 Pages
K. Imanaka	Oct. 27. 1995	ELECTRONIC COMPONENTS GROUP SHARP CORPORATION	REPRESENTATIVE DIVISION	OPTO-ELECTRONIC DEVICES DIV.

REFERENCE

SPECIFICATION

DEVICE SPECIFICATION FOR

SOLID STATE RELAY

MODEL No.

S202TA1

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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).

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 SIP type Solid State Relay (SSR), Model No. S202TA1.

2. Outline

2.1 Refer to the attached drawing No. S3D93145C.

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 This product is not designed against irradiation.

This product is assembled with electrical input and output.

This product incorporates non-coherent light emitting diode.

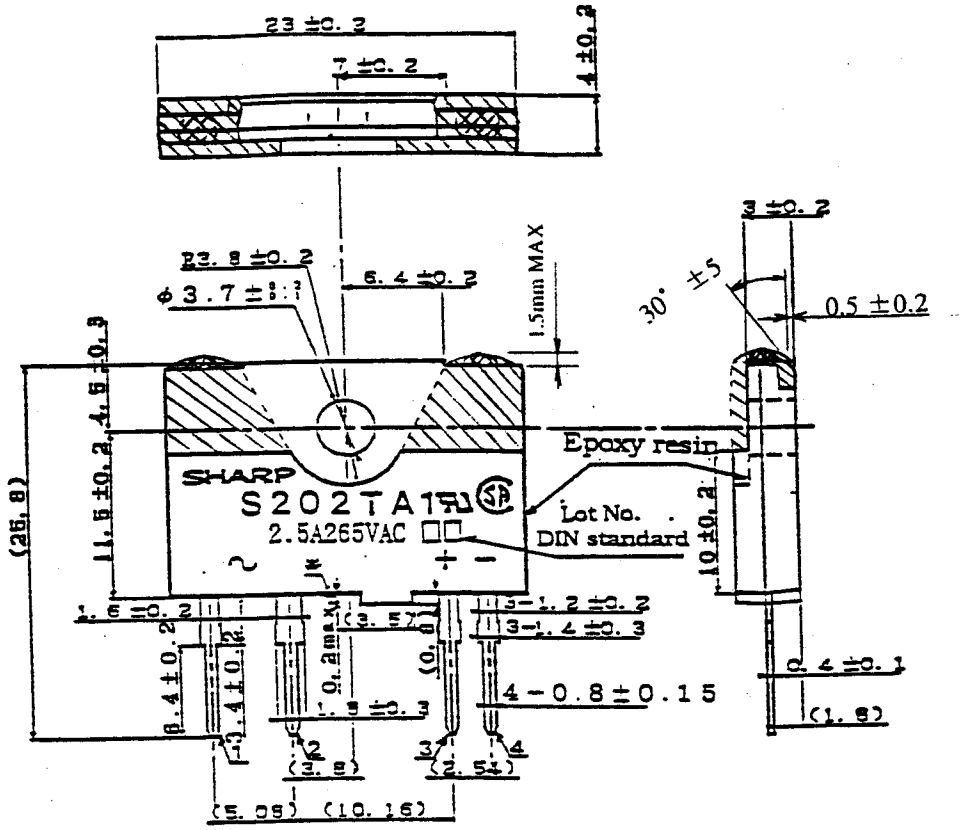
6.2 This Model is approved by UL and CSA.

UL file No. : E94758

CSA file No. : LR63705

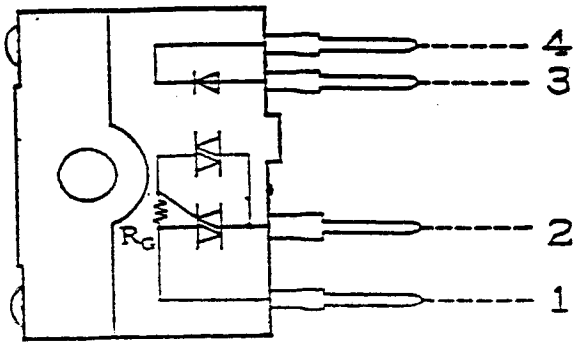
7. Notes

Refer to the attached sheet, Page 8, 9.



Pin finish : Solder plating

Pin Nos. and internal connection diagram



: Coating area (Epoxy resin)

: There are cases where epoxy resin is put in this area.

R_G=100Ω ± 10%

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=1/1mm
Name	S202TA1 Outline Dimensions
Drawing No.	S3D93145C

3.1 Absolute maximum ratings

(Ta=25℃ unless otherwise noted)

Parameter		Symbol	Rating	Unit	Conditions
Soldering temperature		Tsol	260	℃	For 10 s
Operating temperature		Topr	0 to +100	℃	
Storage temperature		Tstg	-40 to +125	℃	
Operating frequency		f	47 to 63	Hz	Ta=0℃ to 100℃
Operating voltage range		Vout	25 to 265	Vrms	Ta=0℃ to 100℃
Isolation voltage (*1)		Viso	3000	Vrms	AC 60Hz, For 1min. RH=40 to 60%
Load power factor (Main triac)		PF	0.2 to 1.0		
Input	Forward current	I_F	50	mA	
	Peak forward current	I_{FM}	1	A(pk)	PW≦100 μs Duty Ratio 0.001
	Reverse voltage	V_R	6	V	
	Maximum junction temperature	Tj	125	℃	
Output (Main triac)	RMS on-state current	I_T	2.5	Arms	Tc=85℃, With heat sink
			1.6	Arms	Tc=100℃, With heat sink
	Repetitive peak on-state current	I_{TRM}	20	A	50ms, Repeatable every 1 s, Tj<125℃
	Peak one cycle surge current	Isurge	140	A	60Hz sine wave Tc=25℃ start
	Repetitive peak off-state voltage	V_{DRM}	600	V	
	Critical rate of rise of on-state current	dI/dt	50	A/ μs	
	Main terminal fusing current	I^2t	80	A^2sec	t=8.3ms
	Junction temperature	Tj	125	℃	

(*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℃ Unless otherwise noted)

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^{-4}	A	V_R=3.0V
Output	Repetitive peak off-state current	I_{DRM}	-	-	10^{-4}	A	Ta=25℃ I_F=0
			-	-	10^{-3}	A	Ta=100℃ V_D=V_{DRM}
	On-state voltage (Main Triac)	V_{T1}	-	1.0	1.1	Vrms	I_F=8mA, R load I_T=2.5Arms
	On-state voltage (Phototriac)	V_{T2}	-	-	2.5	Vrms	I_F=8mA, R load I_T=14mA
	On-state operating current range (Main Triac)	I_{TM1}	25	-	2500	mArms	After latched R Load
	On-state operating current range (Phototriac)	I_{TM2}	10	-	25	mArms	Snubber circuit (Output): C=0.33 μF R=820 Ω, R Load
	Holding current (Main Triac)	I_H	15	-	25	mA	
	Critical rate of rise of off-state voltage (Static)	(dv/dt)s	50	-	-	V/μs	Tj=25℃
			-	300	-	V/μs	Tj=125℃ V_D=400V
	Commutation critical rate of rise of off-state voltage	(dv/dt)c	5	-	-	V/μs	Tj=125℃, V_D=400V dIt/dt=-8.0A/ms
Transfer characteristics	Minimum trigger current	I_{FT}	-	-	8	mA	R Load I_{TM} MAX.
	Isolation resistance	Riso	10^{10}	-	-	Ω	DC500V RH=40 to 60%
	Input-output capacitance	Ciso	-	1.2	-	pF	V=0, f=1.0MHz
	Turn on time	t_{ON}	-	-	1	ms	AC50Hz, I_F=8mA
	Turn off time	t_{OFF}	-	-	10	ms	AC50Hz, I_F=8mA
	Thermal resistance	Rth(j-c)	-	4.0	4.5	℃/W	Triac junction to case
	Thermal resistance	Rth(j-a)	-	40	45	℃/W	Triac junction to ambient
	Snubber capacitor	-	-	0.015	-	μF	
	Snubber resistor	-	-	27	-	Ω	

RMS on-state current derating curve

Fig. 1 Tc-I_T (rms) rating

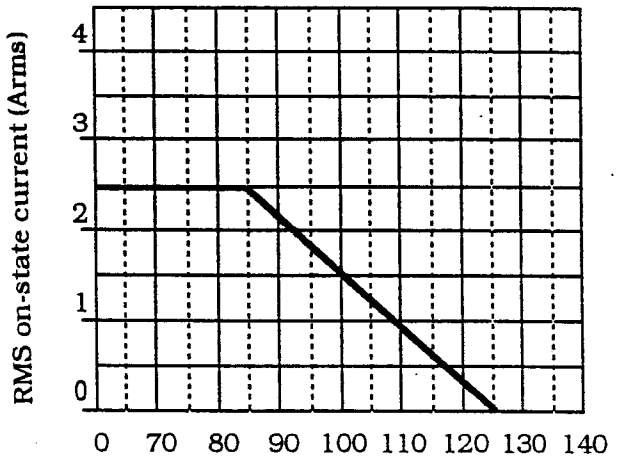
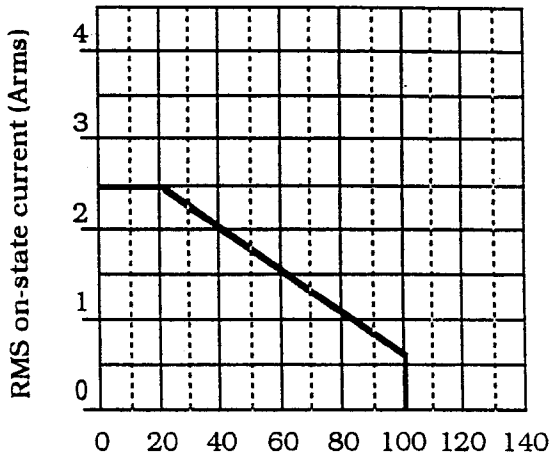


Fig. 2 Ta-I_T (rms) rating



4. Reliability

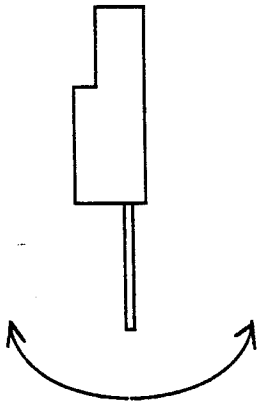
The reliability of products shall be satisfied with items listed below.

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

Test Items	Test Conditions	Judgement Criteria	Samples (n) / Defective (C)
Temperature cycling	1 cycle -40℃ to 125℃ (30min) (30min) 20 cycles test	(1) Forward voltage: I±5% or less (2) Reverse current: USL×2 or less (3) Repetitive peak off-state current: USL×2 or less (4) On-state voltage: USL×1.2 or less (5) Minimum trigger current: USL×1.2 or less (6) Isolation resistance, Isolation voltage: Within the value of spec.	n=22, C=0
High temp. high humidity storage	+60℃, 90%RH, 500h		n=22, C=0
High temp. storage	+125℃, 1000h		n=22, C=0
Low temp. storage	-40℃, 1000h		n=22, C=0
Intermittent operation	AC200V, 2Arms, Ta=25±3℃ For 1min ON, OFF, 500h		n=22, C=0
Vibration	200m/s^2 100 to 2000Hz/4min 4times/X, Y, Z direction		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		n=11, C=0
Terminal strength (Tension)	Weight : 10N 30s/ terminal direction		n=11, C=0
Soldering heat	260℃, 5s Up to 1.5mm from resin portion *2		n=11, C=0
Solderability	230±5℃, 5±0.5s Use rogin flux. *2	Solder shall adhere at the area or 95% or more of A portion	n=11, C=0

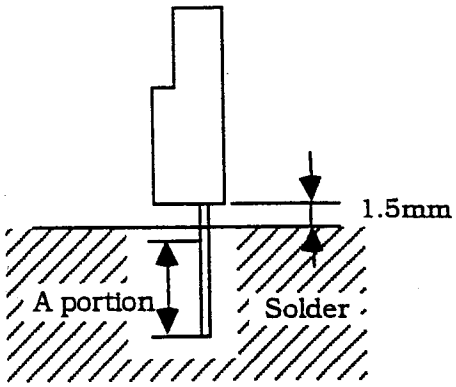
USL : Max. specification values I : Initial values

*1 Terminal bending direction is shown below.



θ

*2 Soldering area is shown below.



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

5. Incoming inspection

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

Inspection items of electrical characteristics :
V_F, I_R, I_{DRM}, V_T, I_H, I_{FT}, Viso, Riso

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 S202TA1. 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) The isolation of the coating resin at top of S202TA1 shall not be guaranteed.

(5) By using optional heat sink, if it is necessary to take isolation voltage between S202TA1 and optional heat sink. Please use insulation sheet.

(6) Optional heat sink shall be installed by screws-fastening torque 0.3 to 0.5N · m. And, please conform to the below items in order to be sunk heat effectively to generating heat in this device.

(a) It shall be no unevenness on contacting surface among heat sink, insulation sheet and device.

(b) It shall be no burr and metal chip etc. on contacting surface among heat sink, insulation sheet and device.

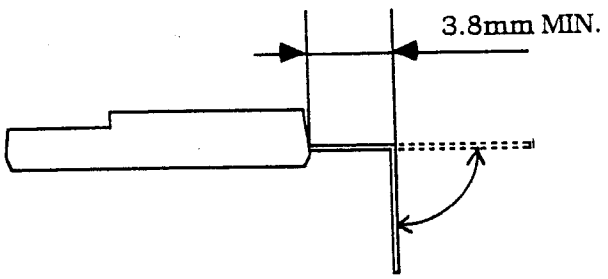
(c) It shall be spread equally silicone grease on contacting surface among heat sink, insulation sheet and device. Silicon grease shall be used such as :

① No secular variation in operating temperature range.
② Base oil does not separate and it does not stay in the device.
③ If base oil permeate into the inside of the device, it does not effect any degradation, for example, due to the expansion of the coating material for chip.

For example, we recommend G-746; Shin-Etsu Chemical Co., Ltd. and SC-102; Dow Corning Toray Silicone Co., Ltd.

(7) If it is necessary to employ screws with installation of optional heat sink, please solder after fixing screws.

(8) 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.



(9) 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 face, 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.

(10) Cleaning conditions:

1) Solvent cleaning: Solvent temperature 45℃ or less
Immersion for 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 Choloro Fluoro Carbon type solvent to clean devices 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 damage package resin.

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