PREPARED BY:	DATE:		SPEC. No. ED-98106
H. Tsunano	June 11 1998	SHARP	ISSUE June 9, 1998
APPROVED BY:	DATE:	ELECTRONIC COMPONENTS GROUP SHARP CORPORATION	PAGE 10 Pages
H. Matsuoka	June 11, 1998	SPECIFICATION	REPRESENTATIVE DIVISION OPTO-ELECTRONIC DEVICES DIV.

REFERENCE

DEVICE SPECIFICATION FOR

SOLID STATE RELAY

MODEL No.

S105T01

(Business dealing name : S105T01)

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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. Matsumura

T. Matsumura,
Department General Manager of
Engineering Dept.,II
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SHARP CORPORATION

1. Application

This specification applies to the outline and characteristics of SIP type Solid State Relay (SSR), Model No. S105T01 (Apply line voltage 100V to 125V AC).

2. Outline

2.1 Refer to the attached drawing No. S3D95016.

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 4 to 6.

3.1 Absolute maximum ratings

3.2 Electrical characteristics

4. Reliability

Refer to the attached sheet, Page 7, 8.

5. Incoming inspection

Refer to the attached sheet, Page 8.

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 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.

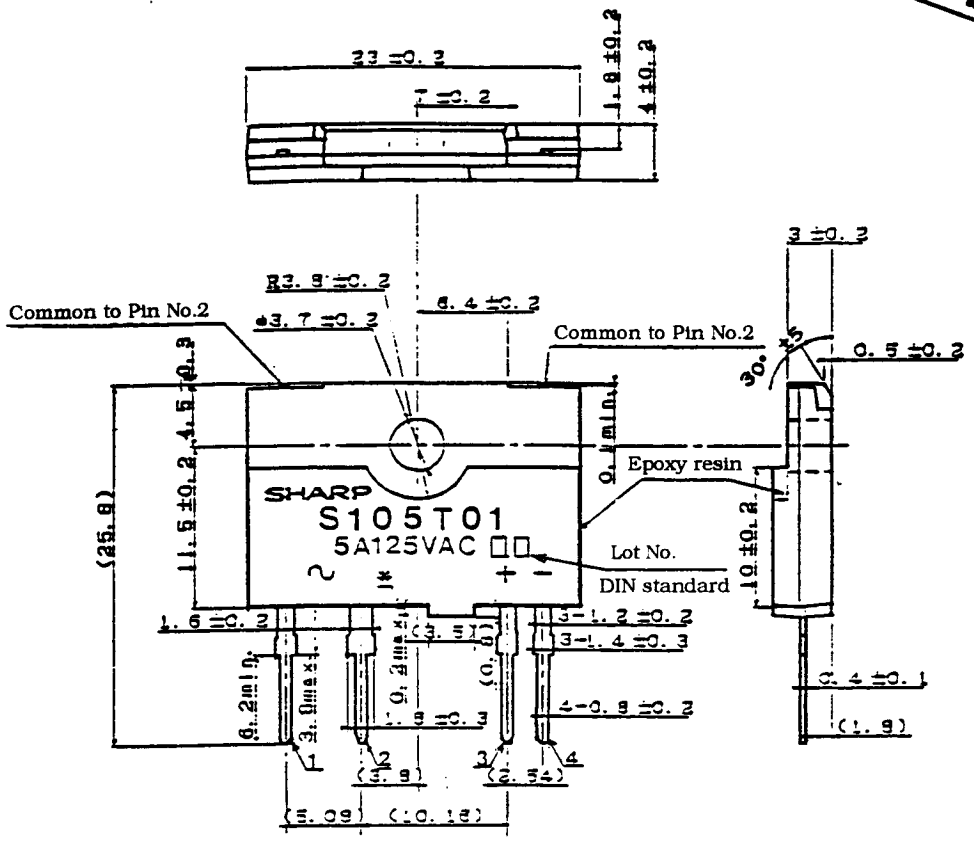
Materials for ODS : CFC_S, Halon, Carbon tetrachloride,
1.1.1-Trichloroethane (Methylchloroform)

6.3 Brominated flame retardants

Specific brominated flame retardants such as the $PBBO_S$ and PBB_S are not used in this device at all.

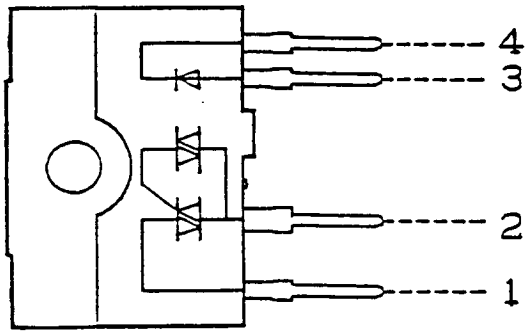
7. Notes

Refer to the attached sheet, Page 9, 10.



Product mass : Approx. 3.5g
Pin finish : Solder plating

Pin Nos. and internal connection diagram



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	S105T01 Outline Dimensions
Drawing No.	S3D95016

3.1 Absolute maximum ratings

Ta=25℃

Parameter		Symbol	Rating	Unit	Conditions
Input	Forward current	I_F	50	mA	
	Reverse voltage	V_R	6	V	
Output	RMS on-state current	I_T	5	Arms	Refer to the Fig.1, 2
	Peak one cycle surge current	Isurge	50	A	60Hz sine wave Tj=25℃ start
	Repetitive peak off-state voltage	V_{DRM}	400	V	
	Non-repetitive peak off-state voltage	V_{DSM}	400	V	
	Critical rate of rise of on-state current	dI_T/dt	50	A/ μs	
	Operating frequency	f	45 to 65	Hz	
Operating temperature		Topr	-25 to +100	℃	
Storage temperature		Tstg	-30 to 125	℃	
Isolation voltage (*1)		Viso	3.0	kVrms	AC 60Hz, For 1min 40 to 60%RH
Soldering temperature		Tsol	260	℃	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℃

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=3V
Output	Repetitive peak off-state current	I_{DRM}	-	-	10^{-4}	A	V_D=V_{DRM}
	On-state voltage	V_T	-	-	1.5	Vrms	I_T=2Arms, R load, I_F=20mA
	Holding current	I_H	-	-	50	mA	
	Critical rate of rise of off-state voltage	dv/dt	30	-	-	V/μs	V_D=2/3V_{DRM}
	Commutation critical rate of rise of off-state voltage	(dv/dt)c	5	-	-	V/μs	Tj=125℃, V_D=2/3V_{DRM}, dIt/dt=-2.5A/ms
Transfer characteristics	Minimum trigger current	I_{FT}	-	-	8	mA	V_D=12V, R_L=30Ω
	Isolation resistance	Riso	10^{10}	-	-	Ω	DC500V 40 to 60%RH
	Turn on time	t_{ON}	-	-	1	ms	AC50Hz
	Turn off time	t_{OFF}	-	-	10	ms	AC50Hz
Thermal resistance		$R_{th(j-c)}$	-	5	-	℃/W	Between junction and case
Thermal resistance		$R_{th(j-a)}$	-	45	-	℃/W	Between junction and ambient

RMS on-state current derating curve

Fig. 1 Ta-I_T (rms) rating

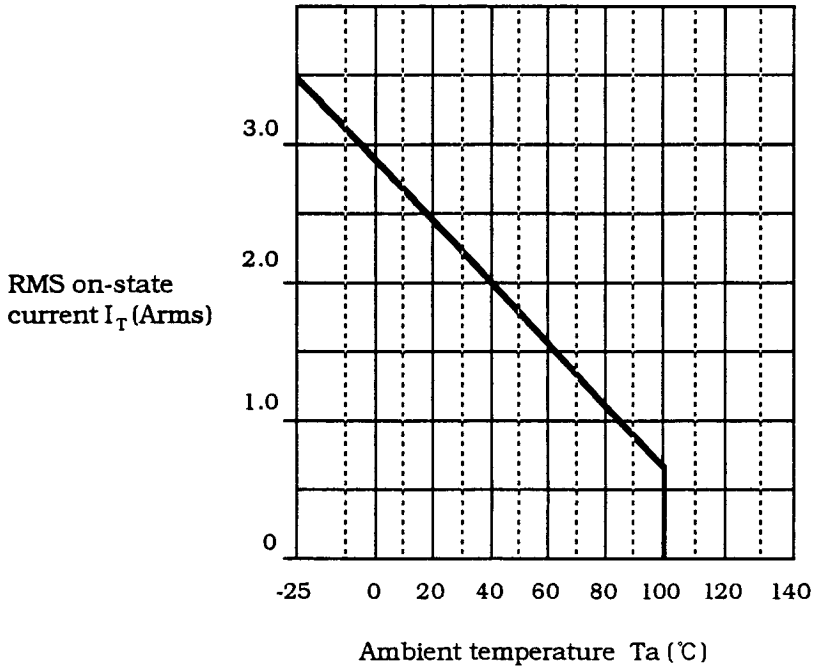
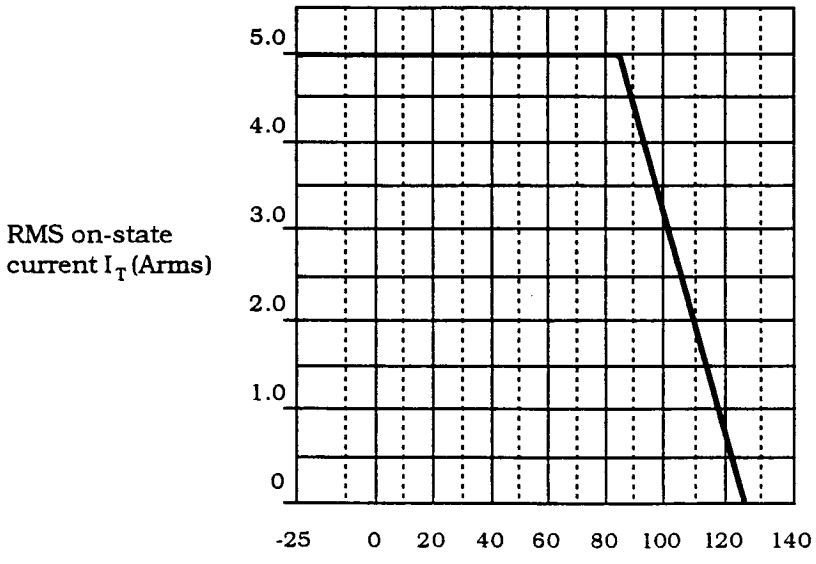


Fig. 2 Tc-I_T (rms) rating



4. Reliability

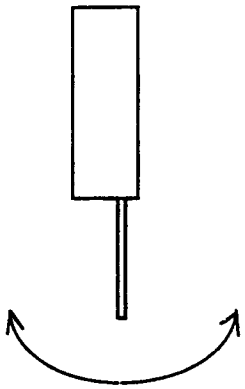
The reliability of products shall satisfy items listed below.

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

Test Items	Test Conditions	Failure Judgement Criteria	Samples (n) / Defective (C)
Temperature cycling	1 cycle -30℃ to +125℃ (30min) (30min) 20 cycles test	(1) V_F>U×1.2	n=22, C=0
High temp. high humidity storage	+60℃, 90%RH, 500h	(2) I_R>U×2.0 (3) I_{DRM}>U×2.0	n=22, C=0
High temp. storage	+125℃, 1000h	(4) V_T>U×1.2	n=22, C=0
Low temp. storage	-30℃, 1000h	(5) I_{FT}>U×1.2	n=22, C=0
Intermittent operation	AC100V, I_T=2Arms, I_F=20mA For 1min ON, OFF Ta=25±3℃, 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	Soldering area < 95% of A portion	n=11, C=0

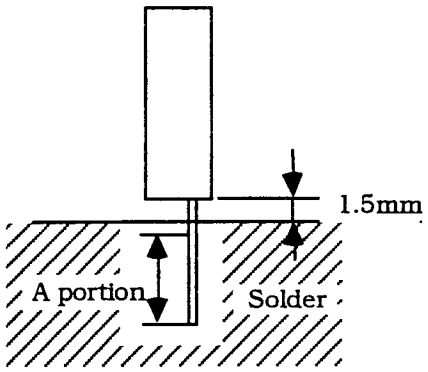
U : Max. specification values

*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 ISO2859 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)

(2) Please make sure that surge absorption circuit and dv/dt control circuit are provided for protection of S105T01. 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) By using optional heat sink, if it is necessary to take isolation voltage between S105T01 and optional heat sink. Please use insulation sheet.

(5) 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.

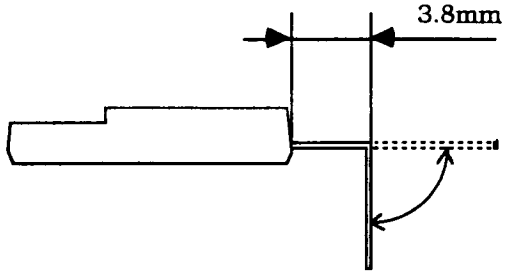
(c) It shall be spread equally silicone grease on contacting surface among heat sink, insulation sheet and device. Silicon grease shall be used such as :

① No secular variation in operating temperature range.
② Base oil does not separate and it does not permeate 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; Toray Dow Corning Silicone Co., Ltd.

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

(6) 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.



(7) 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.

(8) In case that pulse drive is carried out, it shall be recommended to use that the pulse width of input signal is 1ms or more.

(9) Cleaning conditions:

1) Solvent cleaning: Solvent temperature 45℃ or less
Immersion for 3min 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 doesn't occur any defect before starting the ultrasonic cleaning.

3) The following cleaning solvent shall be recommended.

Ethyl alcohol, Methyl alcohol, Isopropyl alcohol

In case 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.

solid state relay, S105T01