

SHARP

OPTO-ANALOG DEVICES DIVISION
ELECTRONIC COMPONENTS GROUP
SHARP CORPORATION

SPECIFICATION

DEVICE SPECIFICATION FOR

SOLID STATE RELAY

MODEL No.

R32MA1

(Business dealing name : PR32MA11NTZF)

Specified for _____

Enclosed please find copies of the Specifications which consists of 11 pages including cover.
This specification sheets and attached sheets shall be both side copy.
After confirmation of the contents, please be sure to send back copies of the Specifications
with approving signature on each.

CUSTOMER'S APPROVAL

DATE _____

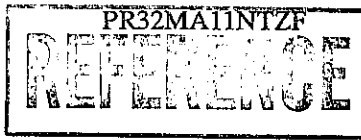
BY _____

PRESENTED

DATE July 24, 2006

BY H. Imanaka

H. Imanaka,
Department General Manager of
Engineering Dept.,II
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ELECOM Group
SHARP CORPORATION



Product name : SOLID STATE RELAY

Model No. : R32MA1

(Business dealing name : PR32MA11NTZF)

1. These specification sheets include materials protected under copyright of Sharp Corporation ("Sharp"). Please do not reproduce or cause anyone to reproduce them without Sharp's consent.
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 etc.)

- (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 etc.)

- (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.



1. Application

This specification applies to the outline and characteristics of lead free type solid state relay Model No. R32MA1 [Apply line voltage 200V AC(sine wave)].

2. Outline

Refer to the attached sheet, page 4.

3. Ratings and characteristics

Refer to the attached sheet, page 5, 6.

4. Reliability

Refer to the attached sheet, page 7.

5. Outgoing inspection

Refer to the attached sheet, page 8.

6. Supplement

6.1 The business dealing name used for this product when ordered or delivered shall be PR32MA11NTZF.

6.2 Package specification

Refer to the attached sheet, page 9,10.

6.3 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.)

6.4 This Model is approved by UL and CSA.

Approved Model No. : R32MA1

UL file No. : E64380

CSA file No. : CA95323

CSA approved mark "  " shall be indicated on minimum unit package.

6.5 This product is not designed against irradiation.

This product is assembled with electrical input and output.

This product incorporates non-coherent light emitting diode.

6.6 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)

6.7 Brominated flame retardants

Specific brominated flame retardants such as the PBBO_s and PBB_s are not used in this device at all.

REFERENCE

7. Notes

7.1 Circuit design

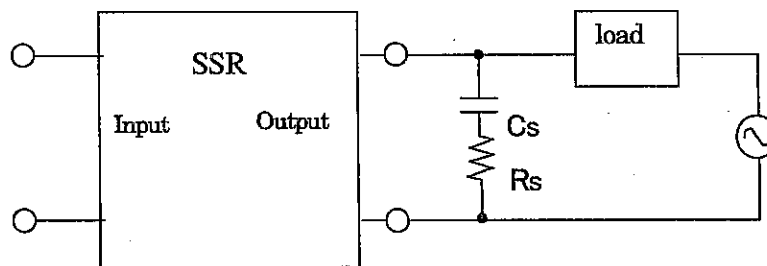
(1) The LED used in the solid state relay generally decreases the light emission power by operation. In case of long operation time, please decide I_F value so that I_F is more than 2 times or more of the maximum value of the Minimum triggering current at circuit design with considering the decreases of the light emission power of the LED. (50% / 5years)

(2) This device doesn't have built-in snubber circuit.

To avoid the false operation and protect SSR, please locate the appropriate snubber circuit between output pins base on the load. (Recommendable values : $R_s=100\ \Omega$, $C_s=0.01\ \mu F$)

Particularly, in case the device is used for the load such as solenoid valves and motors, false operation may happen in off-state due to rapid change of voltage at output pins caused by the phase difference of load current. So please be sure to locate the snubber circuit ($R_s=100\ \Omega$, $C_s=0.01\ \mu F$) and make sure the device works properly in actual conditions.

In addition, the values of snubber circuit may have to be changed if necessary after Tested in actual conditions.



Please locate the snubber circuit as close as possible to the output pins.

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

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

(5) If the voltage exceeding the repetitive peak off-state voltage (V_{DRM}) 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 V_{DRM} shall not be applied by using the varistor, CR.

7.2 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.)

7.3 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.

7.4 Precautions for Soldering

(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 10 s (Pre-heating : 100 to 150°C, 30 to 80 s)

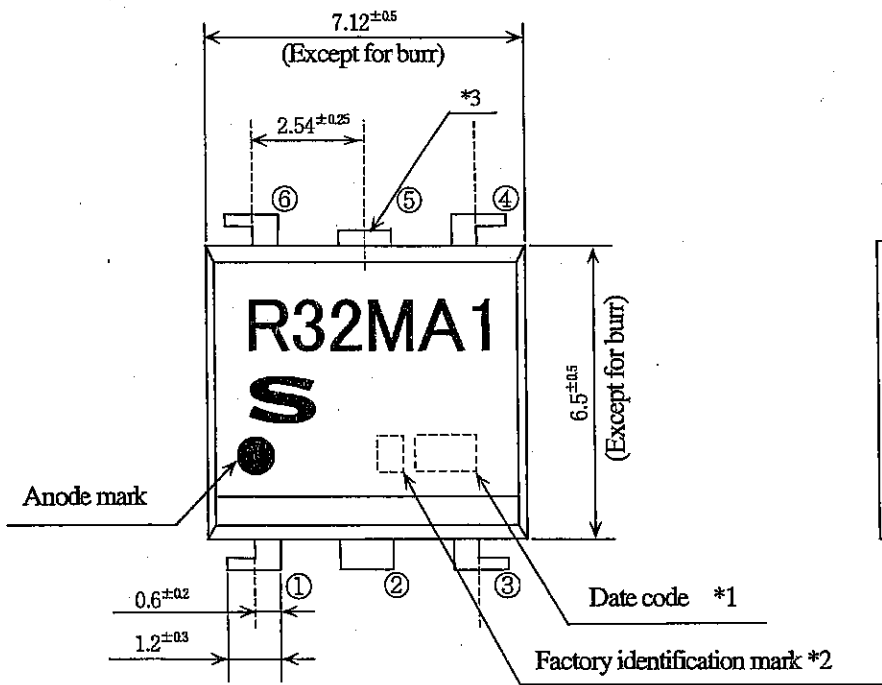
(2) It is recommended that hand soldering be carried out at 400°C or less and within 3 s: Within 2 times

(3) Other notes

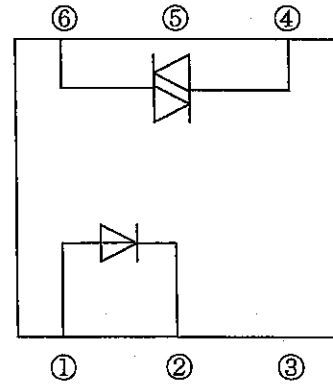
Depending on equipment and soldering conditions (temperature, Using solder etc.),

the effect to junction between PCB and lead pins of solid state relay is different.

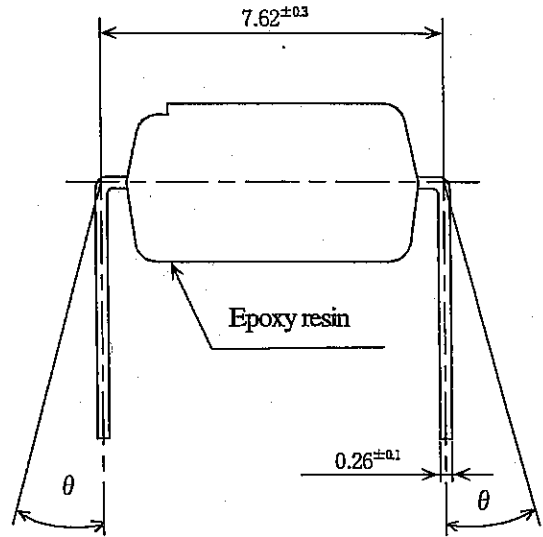
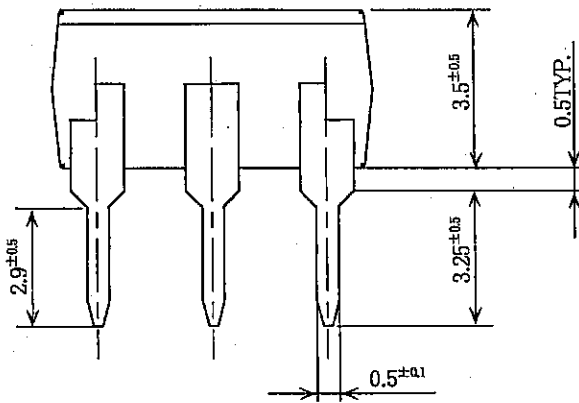
Please confirm that there is no problem on the actual use conditions.



Pin-Number and internal connection diagram



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



$\theta : 0 \sim 13^\circ$

*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) Pin 5 is cut at outside of package.

*4) Pin material : Copper Alloy
Pin finish : SnCu plating (Cu : TYP. 2%)

Product mass : Approx.0.35g

Unit : 1/1mm	
Name	R32MA1 Outline Dimensions (Business dealing name : PR32MA11NTZF)

3.1 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	$I_T(\text{rms})$	150	mA
	Peak one cycle surge current	I_{surge}	1.2 (50Hz sine wave)	A
	Repetitive peak off-state voltage	V_{DRM}	600	V
Isolation voltage *2		$V_{\text{iso}}(\text{rms})$	5	kV
Operating temperature		T_{opr}	-30 to +85	°C
Storage temperature		T_{stg}	-40 to +125	°C
Soldering temperature		T_{sol}	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

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^{-5}	A	$V_R=3\text{V}$
Output	Repetitive peak off-state current	I_{DRM}	-	-	2×10^{-6}	A	$V_D=V_{\text{DRM}}$
	On-state voltage	V_T	-	-	3.0	V	$I_T=150\text{mA}$
	Holding current	I_H	0.1	-	3.5	mA	$V_D=6\text{V}$
	Critical rate of rise of off-state voltage	dv/dt	100	-	-	V/ μs	$V_D=1/\sqrt{2} \cdot V_{\text{DRM}}$
Transfer characteristics	Minimum trigger current	I_{FT}	-	-	10	mA	$V_D=6\text{V}, R_L=100\Omega$
	Isolation resistance	R_{ISO}	5×10^{10}	10^{11}	-	Ω	DC500V 40 to 60%RH
	Turn on time	t_{ON}	-	-	100	μs	$V_D=6\text{V}, R_L=100\Omega, I_F=20\text{mA}$

3.3 Recommend operating condition

Parameter		Symbol	MIN.	MAX.	Unit
I _{pt}	Input signal current at on state	$I_{F(\text{on})}$	20	25	mA
	Input signal current at off state	$I_{F(\text{off})}$	0	0.1	mA
Output	Supply voltage	$V_{\text{out}}(\text{rms})$	-	240	V
	Load current	$I_{\text{out}}(\text{rms})$	-	$I_T(\text{rms}) \times 80\%$ *3	mA
	Frequency	f	50	60	Hz
Operating temperature		T_{opr}	-20	70	°C

*3 $I_T(\text{rms})$ derating at ambient temperature is show in Fig. 2.

Please locate the snubber circuit between output pins. ($R_S=100\Omega, C_S=0.01\mu\text{F}$)

Fig.1 Forward current vs. ambient temperature

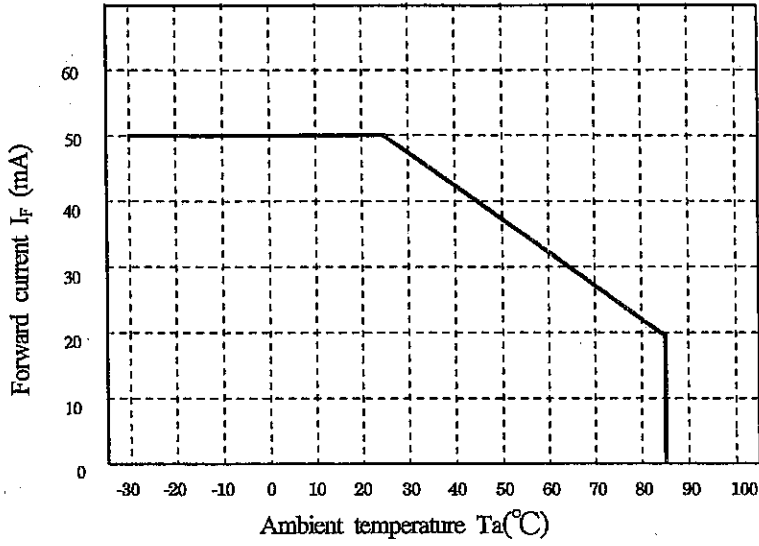
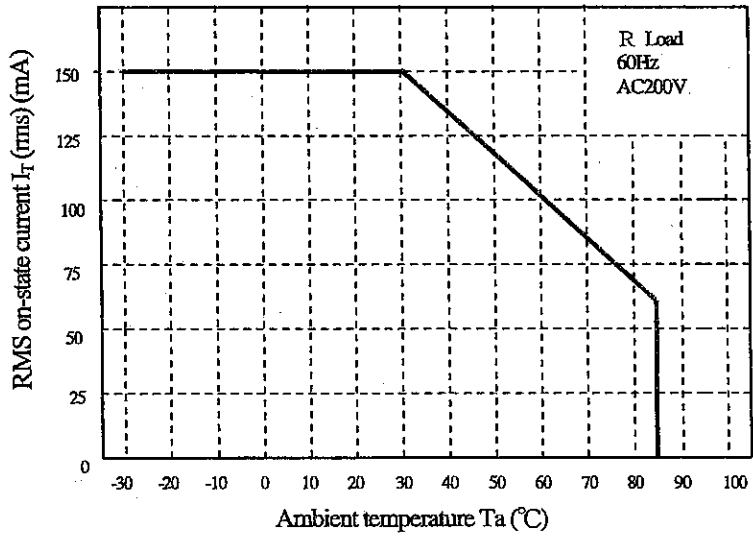


Fig.2 RMS on-state current vs. ambient temperature



This device doesn't have built-in snubber circuit.

To avoid the false operation and protect SSR, please locate the appropriate snubber circuit between output pins base on the load. (Recommendable values : $R_s=100\ \Omega$, $C_s=0.01\ \mu F$)

Particularly, in case the device is used for the load such as solenoid valves and motors, false operation may happen in off-state due to rapid change of voltage at output pins caused by the phase difference of load current. So please be sure to locate the snubber circuit ($R_s=100\ \Omega$, $C_s=0.01\ \mu F$) and make sure the device works properly in actual conditions. In addition, the values of snubber circuit may have to be changed if necessary after Tested in actual conditions.

4. Reliability

The reliability of products shall satisfy items listed below.

Confidence level : 90%

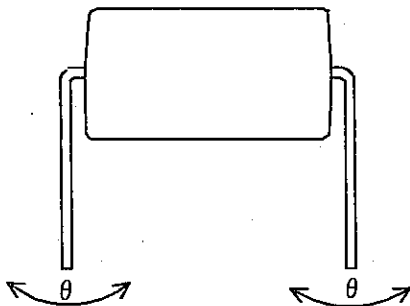
LTPD : 10 or 20

Test Items	Test Conditions *1	Failure Judgement Criteria	Samples (n)
			Defective(C)
Solderability *2	245±3°C, 5s	—	n=11, C=0
Soldering heat	(Flow soldering) 270°C, 10 s	$V_F > U \times 1.2$ $V_T > U \times 1.2$ $I_{FT} > U \times 1.3$ $I_R > U \times 2.0$ $I_{DRM} > U \times 2.0$ U : Upper specification limit L : Lower specification limit	n=11, C=0
	(Soldering by hand) 400°C, 3 s		n=11, C=0
Terminal strength (Tension)	Weight : 5.0N 5 s/each terminal		n=11, C=0
Terminal strength (Bending) *3	Weight : 2.5N 2 times/each terminal		n=11, C=0
Mechanical shock	15km/s ² , 0.5ms 3 times/±X, ±Y, ±Z direction		n=11, C=0
Variable frequency vibration	100 to 2000 to 100Hz/4min 200m/s ² 4 times/ X, Y, Z direction		n=11, C=0
Temperature cycling	1 cycle -40°C to +125°C (30min) (30min) 20 cycles test Without Load		n=22, C=0
High temp. and high humidity storage	+85°C, 85%RH, 500h		n=22, C=0
High temp. storage	+125°C, 1000h		n=22, C=0
Low temp. storage	-40°C, 1000h		n=22, C=0
Operation life	I _F =50mA, I _T =150mA Ta=25°C, 1000h		n=22, C=0

*1 Test method, conforms to EIAJ ED 4701.

*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 Terminal bending direction is shown below.



5. Outgoing 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 ISO 2859 is applied.

The AQL according to the inspection items are shown below.

Defect	Inspection item	AQL (%)
Major defect	Electrical characteristics Unreadable marking	0.065
Minor defect	Appearance defect except the above mentioned.	0.25

6.2 Package specification

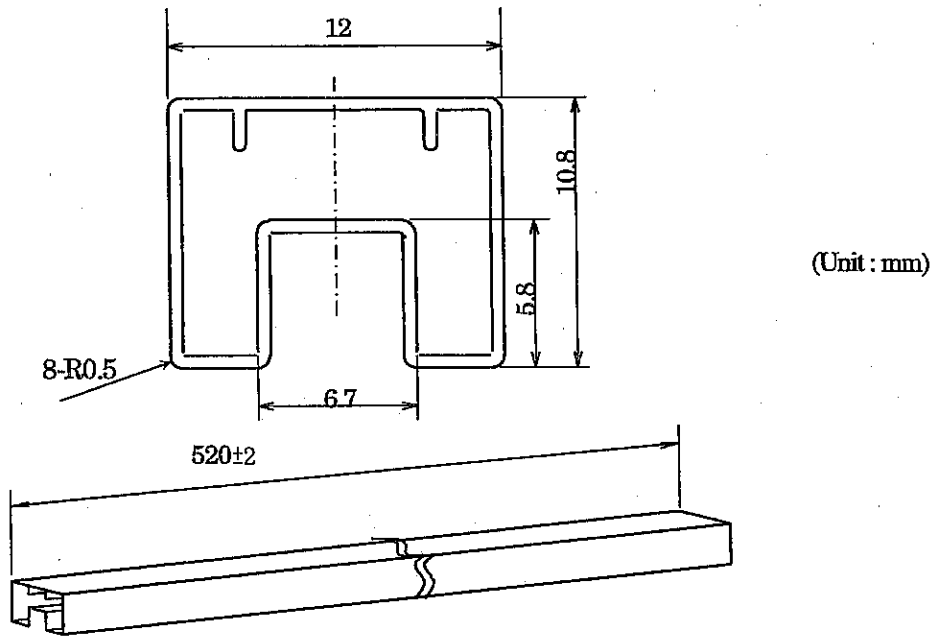
6.2.1 Package materials

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

6.2.2 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.
- (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.

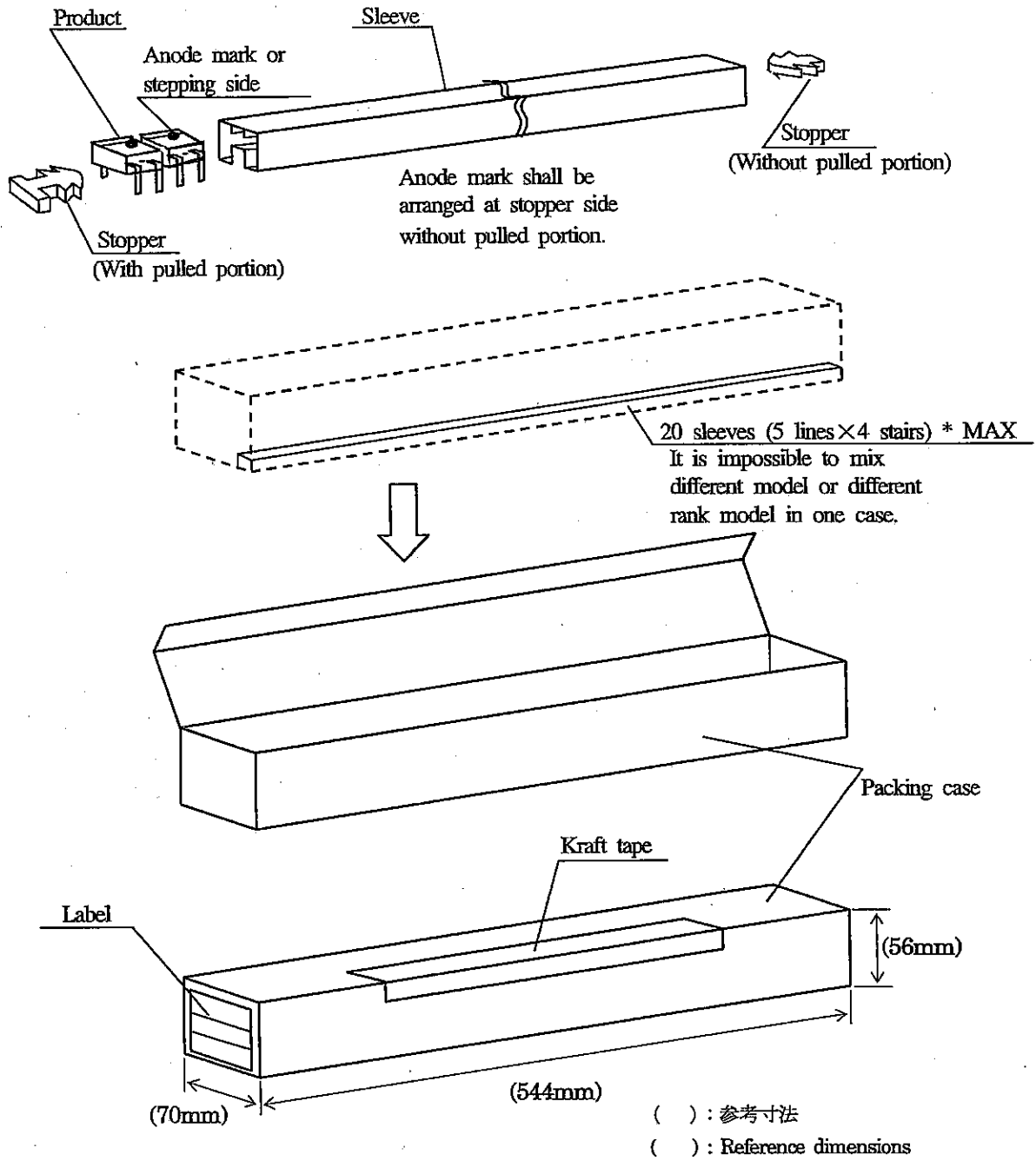
6.2.3. Sleeve drawing



Length : L=520 ± 2mm

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

6.2.4. Packing case outline dimensions



Regular packing mass : Approx. 760g