

PR33MA11NTZF

I_T (rms) \leq 0.3A, Non-Zero Cross type
DIP 6pin
SSR



■Description

PR33MA11NTZF Solid State Relays (SSR) are an integration of an infrared emitting diode (IRED), a Phototriac Detector.

These devices are ideally suited for controlling high voltage AC loads with solid state reliability while providing 5.0kV isolation (V_{iso} (rms)) from input to output.

■Agency approvals/Compliance

1. Package resin : UL flammability grade (94V-0)

■Applications

1. Isolated interface between high voltage AC devices and lower voltage DC control circuitry.
2. Switching small capacity motors, fans, heaters, solenoids, and valves.
3. Phase or power control in applications such as lighting and temperature control equipment.

■Features

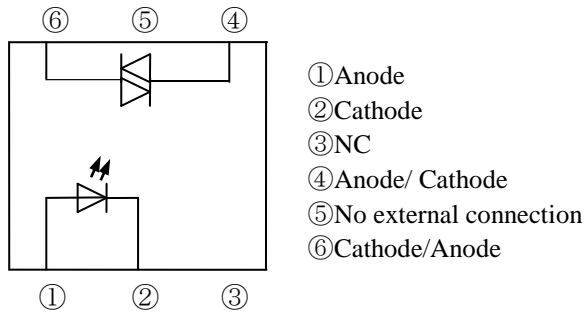
1. Output current, I_T (rms) \leq 0.3A
2. Non-zero crossing functionary
3. 6 pin DIP package
4. High repetitive peak off-state voltage
(V_{DRM} : 600V, PR33MA11NTZF)
5. Superior noise immunity (dV/dt : MIN. 1000V/ μ s)
6. Response time, t_{on} : MAX. 100 μ s
7. Double transfer mold construction
(Ideal for Flow Soldering)
8. High isolation voltage between input and output
(V_{iso} (rms) : 5.0kV)

Notice The content of data sheet is subject to change without prior notice.

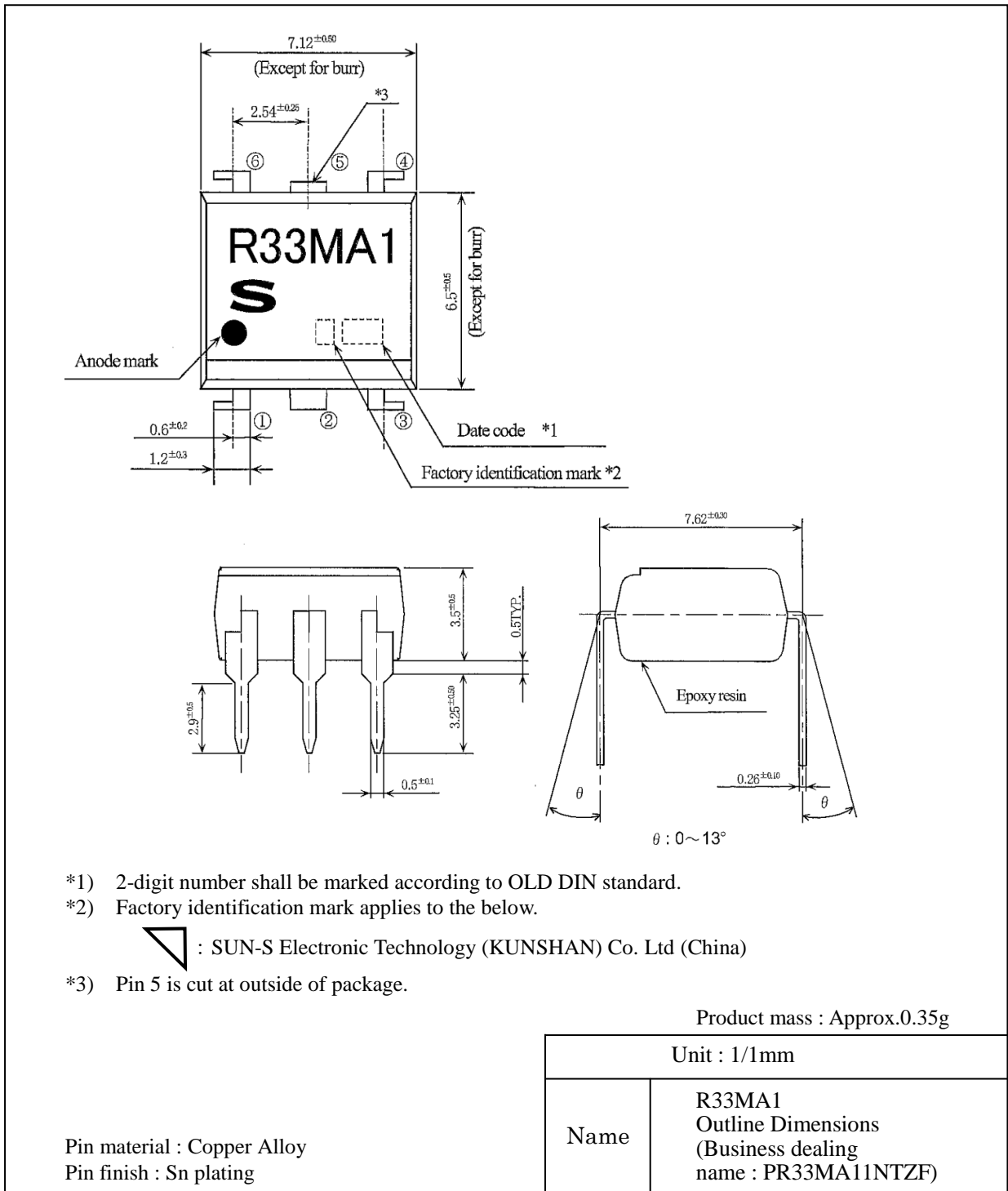
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Sheet No.: OP13017EN

■ Internal Connection Diagram



■ Outline



*1) 2-digit number shall be marked according to OLD DIN standard.

*2) Factory identification mark applies to the below.



: SUN-S Electronic Technology (KUNSHAN) Co. Ltd (China)

*3) Pin 5 is cut at outside of package.

■ 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)}	0.3	A
	Peak one cycle surge current *2	I _{surge}	3	A
	Repetitive peak off-state voltage	V _{DRM}	600	V
Isolation voltage *3		Viso(rms)	5	kV
Operating temperature		Topr	-40 to +85	°C
Storage temperature		Tstg	-40 to +125	°C
Soldering temperature *4		Tsol	270	°C

*1 The derating factors of absolute maximum rating due to ambient temperature are shown in Fig.1, 2.

*2 50Hz sine wave

*3 AC for 1min, 40 to 60%RH, f=60Hz

*4 For 10s

■ 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	μA	V _R =3V
Output	Repetitive peak off-state current	I _{DRM}	-	-	100	μA	V _D =V _{DRM}
	On-state voltage	V _T	-	-	3.0	V	I _T =300mA
	Holding current	I _H	-	-	3.0	mA	V _D =6V
	Critical rate of rise of off-state voltage	dv/dt	1000	-	-	V/μs	V _D =(1/√2) · V _{DRM}
Transfer characteristics	Minimum trigger current	I _{FT}	-	-	15	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}	-	-	100	μs	V _D =6V, R _L =100Ω, I _F =20mA

■ Recommend operating condition

Parameter		Symbol	MIN.	MAX.	Unit
Input	Input signal current at on state	I _{F(on)}	30	36	mA
	Input signal current at off state	I _{F(off)}	0	0.1	mA
Output	Supply voltage	Vout(rms)	-	240	V
	Load current	Iout(rms)	-	I _{T(rms)} ×80% *5	mA
	Frequency	f	50	60	Hz
Operating temperature		Topr	-30	70	°C

*5 I_{T(rms)} derating at ambient temperature is show in Fig. 2.Please locate the snubber circuit between output pins. (R_s=47Ω, C_s=0.022μF)

Fig.1 Forward current vs. ambient temperature

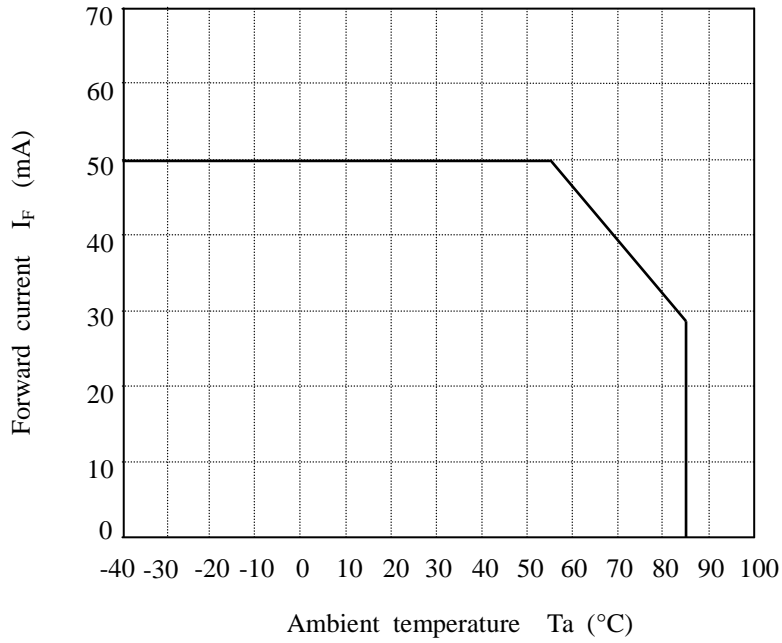
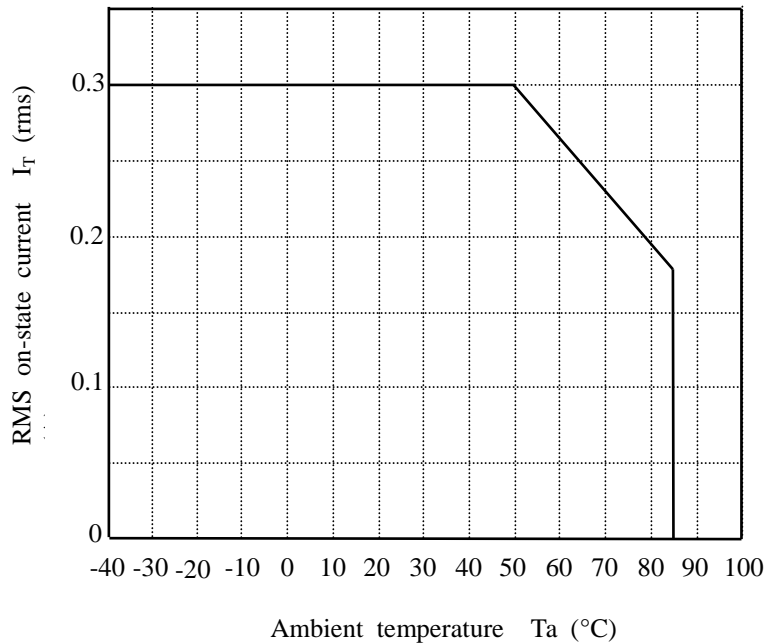


Fig.2 RMS on-state current vs. ambient temperature(*1)



*1 Mounting conditions
 No-heat sink Paper phenol board : 100mm×100mm×1.6mm
 All pins should be installed in the print board with soldering.
 Whole solder landing dimensions : 140mm²

■ **Supplements**

- The business dealing name used for this product when ordered or delivered shall be PR33MA11NTZF.
- 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 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
Specific brominated flame retardants (PBB and PBDE) are not used in this device at all.
- Compliance with each regulation
 - 1) The RoHS directive(2002/95/EC)
This product complies with the RoHS directive(2002/95/EC) .
Object substances: mercury, lead (except for lead in high melting temperature type solders^{*1} and glass of electronic components), cadmium, hexavalent chromium, polybrominated biphenyls(PBB)and polybrominated diphenyl ethers(PBDE)
^{*1} : i.e. tin-lead solder alloys containing more than 85% lead
 - 2) Content of six substances specified in Management Methods for Control of Pollution Caused by Electronic Information Products Regulation (Chinese : 电子信息产品污染控制管理办法).

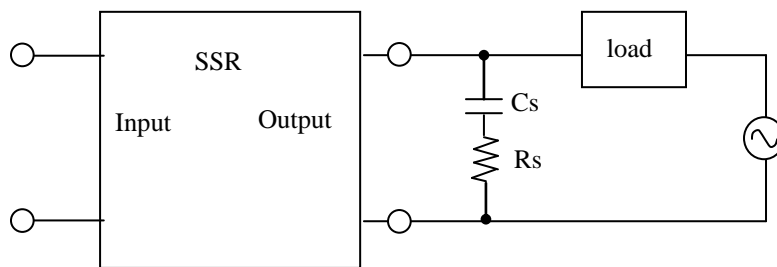
Category	Toxic and hazardous substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chromium (Cr ⁶⁺)	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
Solid State Relay	✓	✓	✓	✓	✓	✓

✓ : indicates that the content of the toxic and hazardous substance in all the homogeneous materials of the part is below the concentration limit requirement as described in SJ/T 11363-2006 standard .

■Notes

●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 : $R_s=47\Omega$, $C_s=0.022\mu F$)
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 ($R_s=47\Omega$, $C_s=0.022\mu F$) 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.

●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.

●Using method

As to this product, all pin shall be used by soldering on the print wiring board. (Socket and others shall not be used.)

●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 10s (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 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 solid state relay is different.
Please confirm that there is no problem on the actual use conditions.

■ **Package specification**

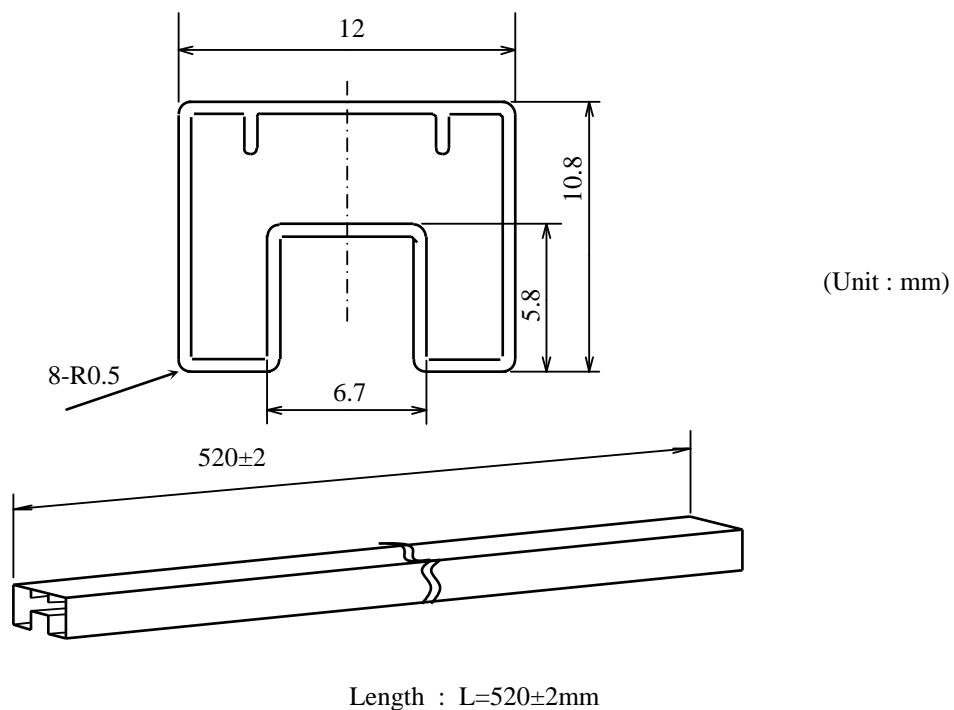
● **Package materials**

No.	Name	Materials	Purposes
①	Sleeve	HIPS or ABS 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**

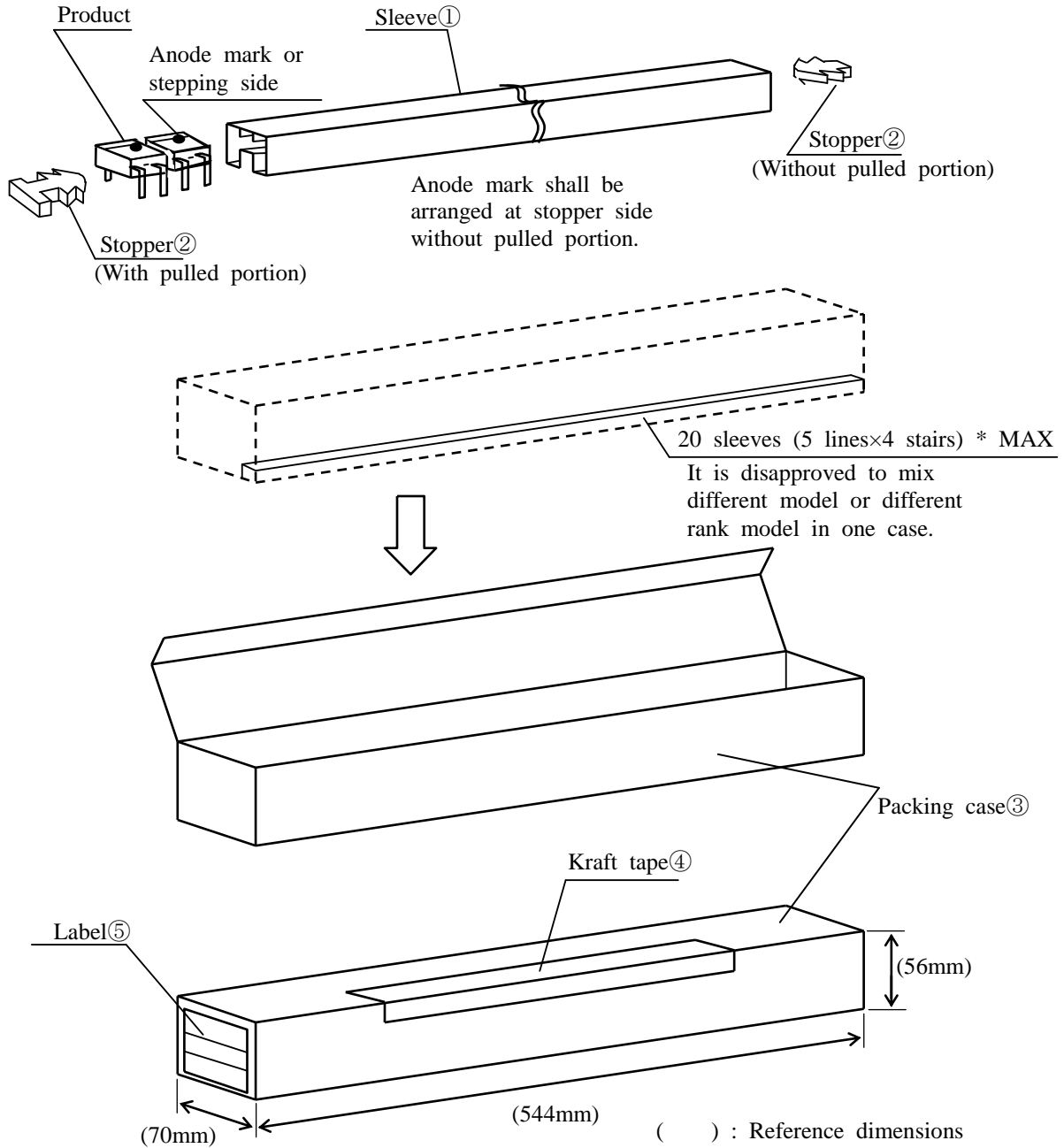
- (1) MAX. 50pcs. of products shall be packaged in a sleeve ① and both of sleeve edges shall be fixed by stoppers ②.
- (2) MAX. 20 sleeves (Product : 1000pcs.) above shall be packaged in a packing case ③.
- (3) The label ⑤ shall be put on the side of the packing case.
- (4) Case shall be closed with the lid and enclosed with kraft tape ④.

● **Sleeve drawing**



- 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

■ Important Notices

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(i) The devices in this publication are designed for use in general electronic equipment designs such as:

- Personal computers
- 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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