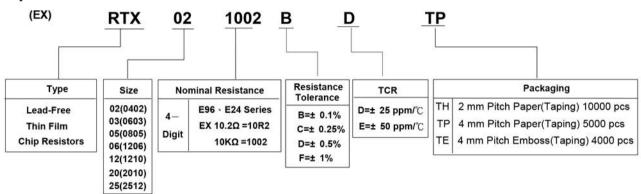
#### 1 Scope:

This specification is applicable to lead and halogen free RTX series thin film chip resistors.

#### 2 Explanation Of Part Numbers:



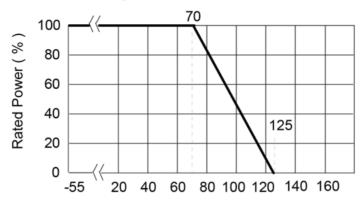
#### 3 General Specifications:

_	Rated	Max.	Max.	TCD	3	Resistan	ce Range			
Type	Power at 70°C	Working Voltage	Overload Voltage	T.C.R. (ppm/°C)	B(± 0.1%) E-96 · E24	C(± 0.25%) E-96 · E24			1%) • E24	
RTX02	1/16 W	50V	100V	± 25	<b>10</b> Ω <b>~ 121K</b> Ω					
KING	16		1001	± 50		1032	1211132			
RTX03	<u>1_w</u>	75V	150V	± 25		100 ~	<b>681Κ</b> Ω			
KIAUS	$\frac{1}{10}$ W	750	1300	± 50		1022	0011122			
DTVAE	1 1 11	450)/	2001/	± 25	10Ω ~ 1.5MΩ					
RTX05	$\frac{1}{8}$ W	150V	300V	± 50						
RTX06	_1_w	200V	400V	± 25	10Ω ~ 1.5MΩ					
KIAUU	$\frac{1}{8}$ W	2000	4000	± 50		1032 ~	1.510122			
RTX12	_1_w	200V	400V	± 25		100 -	- 1MΩ			
KIAIZ	$\frac{1}{4}$ W	2000	4000	± 50		1077 ~	* 11VI\22			
RTX20	1 w	200V	400V	± 25		100 -	.1MO			
KIAZU	$\frac{1}{2}$ W	2007	4000	± 50	- 10Ω ~ 1MΩ					
DTV2E	3 w	200V	400V	± 25	100 4140					
RTX25	$\frac{3}{4}$ W	2007	4000	± 50	- 10Ω ~ 1MΩ					
Ope	rating Temp	erature Ran	ge			–55°C ~ +129	<b>5</b> ℃			

#### 3.1 Power Derating Curve:

Operating Temperature Range : -55° C ~125° C

For resistors operated in ambient temperatures above 70  $^{\circ}$ C, power rating shall be derated in accordance with figure below.



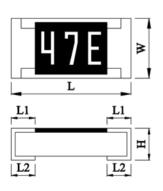
#### 3.2 Voltage Rating:

Rated Voltage: The resistor shall have a DC continuous working voltage or a rms. AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined from the following:

$$E = \sqrt{R \times P}$$
 E= Rated voltage (v)  
P= Power rating (w)

R= Nominal resistance( $\Omega$ )

#### 4 Dimensions:

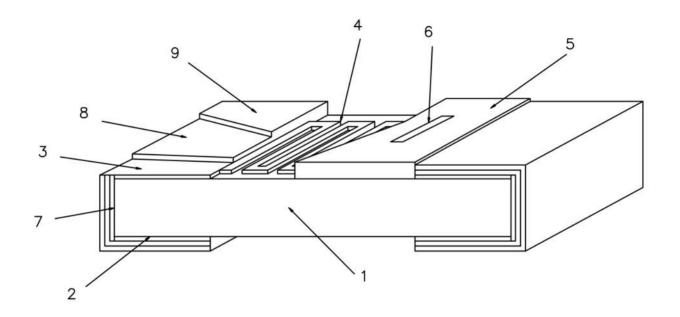


Dir	Dimensions		w	н	L1	L2	
TYPE	Size Code						
RTX02	0402	1.00± 0.10	0.50± 0.05	0.30± 0.05	0.20± 0.10	0.25± 0.10	
RTX03	0603	1.60± 0.10	0.80± 0.10	0.45± 0.10	0.30± 0.15	0.30± 0.15	
RTX05	0805	2.00± 0.10	1.25± 0.10	0.50± 0.10	0.35± 0.20	0.35± 0.15	
RTX06	1206	3.05± 0.10	1.55± 0.10	0.55 <sup>+0.10</sup> -0.05	0.45± 0.20	0.35± 0.15	
RTX12	1210	3.05± 0.10	2.55± 0.10	0.55± 0.10	0.50± 0.20	0.50± 0.20	
RTX20	2010	5.00± 0.20	2.50± 0.20	0.55± 0.10	0.60± 0.20	0.60± 0.20	
RTX25	2512	6.30± 0.20	3.20± 0.20	0.55± 0.10	0.60± 0.20	0.60± 0.20	





### 5 Structure Graph:



1	Ceramic substrate	6	Marking
2	Bottom inner electrode	7	Terminal inner electrode
3	Top inner electrode	8	Ni plating
4	Resistive layer	9	Sn plating
5	Protective coating		



#### 6 Reliability Test

#### 6.1 Electrical Performance Test

6.1 Electri	ical Performance Test	
ITEM	Conditions	Specifications
I I LIVI	Conditions	Resistors
Temperature Coefficient of Resistance	TCR (ppm/°C) = $\frac{(R2-R1)}{R1 (T2-T1)} \times 10^6$ R1: Resistance at room temperature R2: Resistance at -55°C or +125°C T1: Room temperature T2: Temperature -55°C or +125°C Refer to JIS-C5201-1 4.8	Refer to item 3. general specifications
Short Time		$\pm (0.5\% + 0.05\Omega)$
Overload	release the load for about 30 minutes , then measure its	
	resistance variance rate. (Rated voltage refer to item 3. general specifications) Refer to JIS-C5201-1 4.13	No evidence of mechanical damage.
Insulation Resistance	Put the resistor in the fixture, add 100 VDC in + ,- terminal for 60 sec then measured the insulation resistance between electrodes and insulating enclosure or between electrodes and base material.  Refer to JIS-C5201-1 4.6  Metal block measuring Point A Insulating plate Metal plate measuring point B Pressurizing by spring R0.5mm	
Dielectric	Put the resistor in the fixture, add VAC (see SPEC below) in +,-	No short or burned on the appearance.
Withstand Voltage	terminal for. RTX02 \ 03 apply 300 VAC 1 minute. RTX05 \ 06 \ 12 \ 20 \ 25 apply 500 VAC 1 minute. Refer to JIS-C5201-1 4.7	
Intermittent	Put the tested resistor in chamber under temperature 25± 2°C	$\pm (0.5\% + 0.05\Omega)$
Overload	and load the rated DC voltage for 1 sec on , 25 sec off , 10000 $^{+400}_{0}$ test cycles, then it be left at no-load for 1 hour ,then measure its resistance variance rate. Refer to JIS-C5201-1 4.13	
Noise Level	Refer to JIS-C5201-1 4.12	Resistance Noise
		$\begin{array}{ccc} R & <100\Omega & \leq -10 \text{db}(0.32 \text{ uV/V}) \\ 100\Omega & \leq R < 1 \text{K}\Omega & \leq 0 \text{db}(1.0 \text{ uV/V}) \end{array}$
		$1K\Omega \le R < 10K\Omega \qquad \le \qquad 0db(1.0 \text{ dV/V})$ $1K\Omega \le R < 10K\Omega \qquad \le \qquad 10db(3.2 \text{ dV/V})$
		$10K\Omega \le R < 100K\Omega \le 15db(5.6 \text{ uV/V})$
		$\begin{array}{c ccc} 100K\Omega & \leq R < 1M\Omega & \leq 20db(10 \text{ uV/V}) \\ \hline 1M\Omega & \leq R & \leq 30db(32 \text{ uV/V}) \\ \end{array}$
	l .	



#### 6.2 Mechanical Performance Test

ITEM		Conditions	Specifications
ITEM		Conditions	Resistors
Core Body Strength	1.02 Kgf } force on t 1.RTX02 \ 03 : prob	the sample for 10 sec. be R0.2 20 \ 25 : probe R0.5	$\pm \ (0.5\% + 0.05\Omega)$ No evidence of mechanical damage. No side conductive peel off.
Terminal strength	pushing force Test2:The resistor m force on the s termination is Refer to JIS-C5201-	1 4.16	Test1: No evidence of mechanical damage. Test2: ≥5N
Resistance to solvent		ne immersed into isopropyl alcohol of min, then the resistor is left in the	$\pm (0.5\% + 0.05\Omega)$
Solvent		measured its resistance variance	No evidence of mechanical damage, no G2 overcoating and Sn layer by leaching.
Solderability	temperature of 105°C pressure of 1.22× 10 after left the tested in hours or more. Test method:  Test item1 (solder The resistor be im temperature 235± is left as placed ur solder area.  Test item2 (wetting Add flux into resist balance machine, must be measured Testing conditions for Solder temperature Immersion speed Immersion angle  Mass of solder ball	mersed into solder pot in  3°C for 2± 0.5 sec, then the resistor of the resis	1.Test item 1: Solder coverage over 95% 2.Test item 2: Zero cross time within 3 seconds.



ITEM	Conditions	Specifications
112.11	Conditions	Resistors
Resistance to	The tested resistor be immersed into molten solder of	± (0.5%+0.05Ω)
soldering heat	260± 5°C for 10 seconds. Then the resistor is left in the room for 1 hour.  Refer to JIS-C5201-1 4.18	No evidence of electrode damage. No side conductive peel off.
Bending Test	Solder tested resistor on to PC board. add force in the middle down , and under load measured its resistance variance rate.  D: RTX02 \ 03 \ 05=5mm  RTX06 \ 12=3mm  RTX20 \ 25=2mm	± (0.5%+0.05Ω)  No evidence of mechanical damage.  No terminal peel off and core body cracked.
	Solder  Supporting jig  Chip resistor	
	Pressurize  OHM Meter  OHM Meter	
	Refer to JIS-C5201-1 4.33	
Leaching Test	The tested resistor be immersed into molten solder of 260± 5°C for 30 seconds. Then the resistor is left as placed under microscope to observed its solder area.	Solder coverage over 95%.     The underlying material (such as ceramic) shall not be visible at the crest corner area of the electrode.
Vibration	The resistor shall be mounted by its terminal leads to the supporting terminals on the solid table. The entire frequency range :from 10 Hz to 55 Hz and return to 10 Hz, shall be transferred in 1 min.  Amplitude :1.5 mm  This motion shall be applied for a period of 2 hours in each 3 mutually perpendicular directions (a total of 6 hr)  Refer to JIS-C5201-1 4.22	$\pm$ (0.5%+0.05 $\Omega$ ) No evidence of mechanical damage.



#### 5.3 Environmental Test

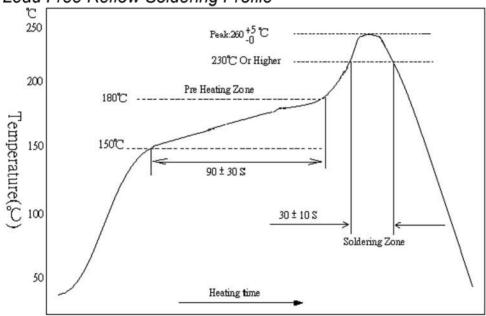
ITEM	Condition	Specifications	
ITEM	Condition	is	Resistors
Resistance to	Put tested resistor in chamber under		± (0.5%+0.05Ω)
Dry Heat	1000 +48/-0 hours. Then leaving the temperature for 60 minutes , and me variance rate.	No evidence of mechanical damage.	
	Refer to JIS-C5201-1 4.25		
Thermal Shock	Put the tested resistor in the ther under the temperature cycle which following table shall be repeated consecutively. Then leaving the troom temperature for 1 hours, ar resistance variance rate.	ch shown in the 300 times tested resistor in the	$\pm (0.5\% + 0.05 \Omega)$ No evidence of mechanical damage.
		Testing Condition	
	Lowest Temperature	-55± 5℃	
	Highest Temperature	125± 5℃	
	Temperature-retaining time		
Loading Life	Refer to MIL-STD 202 Method 10 Put the tested resistor in the chambe		± (0.5%+0.05Ω)
in Moisture	minutes on, 30 minutes off, total 100 tested resistor in room temperature f measure its resistance variance rate Refer to JIS-C5201-1 4.24	or 60 minutes, and	No evidence of mechanical damage.
Load Life	Put the tested resistor in chambe		$\pm (0.5\% + 0.05\Omega)$
	70± 2°C and load the rated volta minutes off, total 1000 hours. The resistor in room temperature for the measure its resistance variance Refer to JIS-C5201-1 4.25	en leaving the tested 60 minutes, and	No evidence of mechanical damage.
Low	Put the tested resistor in the cha		$\pm (0.5\% + 0.05\Omega)$
Temperature Operation	temperature 25°C. Decreasing the and keep the temperature at -55 the rated voltage for 45 minutes. Then leaving the tested resistor i 8± 1 hours, and measure its resister to MIL-R-55342D 4.7.4	No evidence of mechanical damage.	
Whisker Test	⊚Test item 1 (Thermal Shock te	st):	Max. 50 μ m
	Minimum storage temperat	ure	
	Maximum storage temperat	ure 85± 2°C	
	Temperature-rataining tim	ne 7 min.	



ITEM	Cond	litions	Specifications
ITEM	Cond	litions	Resistors
	⊚Test item 2 (Constant tem	perature/humidity test):	
	Temperature	85℃	
	Humidity	85%	
	Testing duration	500± 4 hours	
	⊙Inspection: Inspect for whisker formation went the acceleration test sp with a magnifier (stereo micr higher magnification. If judgr use a scanning electron micr 1,000 or higher magnification	pecified in subciause 4.2, roscope) of about 40 or ment is hard in this method, roscope (SEM) of about	

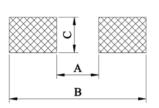
#### 7 Recommend Soldering Method

7.1 Lead Free Reflow Soldering Profile



7.2 Soldering Iron: temperature 350  $^{\circ}C^{\pm}$  10  $^{\circ}C$  , dwell time shall be less than 3 sec.

#### 8 Recommend Land Pattern Design (For Reflow Soldering): (mm)



TYPE DIM	A	В	С
RTX02	0.5	1.5	0.6
RTX03	0.8	2.1	0.9
RTX05	1.2	3.0	1.3
RTX06	2.2	4.2	1.6
RTX12	2.2	4.2	2.8
RTX20	3.5	6.1	2.8
RTX25	3.8	8.0	3.5

#### 9 Marking Diagrams:

9.1 RTX05 \ \ 06 \ \ 12 \ \ \ 20 \ \ \ 25 \ \ \ \ 0.1\% \ \ \ \ \ \ \ 0.25\% \ \ \ \ \ \ \ \ 1\% Tolerance:

9.1.1.1 Resistance Range  $\geq$  100  $\Omega$ : 4 digits in E-24 series or E-96 series, first three digits are significant figures, forth digit is multiplier (10 $^{\times}$ ).

$$\langle EX \rangle$$
 Marking→1002  
1002=100× 10<sup>2</sup>=10000 Ω=10KΩ

9.1.1.2 Resistance Range < 100  $\Omega$  : 4 digits in E-24 series or E-96 series, three digits are significant figures, R digit is multiplier (10 $^{\times}$ ).

$$\langle EX \rangle$$
 Marking→10R2 ,R digit is multiplier (10<sup>-1</sup>).  
10R2=102× 10<sup>-1</sup>=10.2Ω  
Marking→1R02 ,R digit is multiplier (10<sup>-2</sup>).  
1R02=102× 10<sup>-2</sup>=1.02Ω

9.2 RTX03  $\pm$  0.1%  $\cdot$   $\pm$  0.25%  $\cdot$   $\pm$  0.5%  $\cdot$   $\pm$  1% Tolerance: For EIAJ-96 Marking.

$$\langle EX \rangle$$
 Marking→47B  
47B=301× 10<sup>1</sup>=3010Ω=3.01KΩ

If the resistance is not in E-96 series and in E-24 series ,the marking is expressed by E-24 series and one short bar under marking letter.

R value 
$$> 100\,\Omega$$
:marking 391 391=39 x10<sup>1</sup>=390 $\Omega$   
R value  $< 100\,\Omega$ :marking 390 390=39 x10<sup>0</sup>=39 $\Omega$ 

#### 9.3 RTX02 No Marking



#### 9.4 EIAJ-96 Marking:

This table shows the first two digits for the three-digits EIAJ-96 part marking scheme. The third character is a letter multiplier:

Code	Ω														
01	100	13	133	25	178	37	237	49	316	61	422	73	562	85	750
02	102	14	137	26	182	38	243	50	324	62	432	74	576	86	768
03	105	15	140	27	187	39	249	51	332	63	442	75	590	87	787
04	107	16	143	28	191	40	255	52	340	64	453	76	604	88	806
05	110	17	147	29	196	41	261	53	348	65	464	77	619	89	825
06	113	18	150	30	200	42	267	54	357	66	475	78	634	90	845
07	115	19	154	31	205	43	274	55	365	67	487	79	649	91	866
08	118	20	158	32	210	44	280	56	374	68	499	80	665	92	887
09	121	21	162	33	215	45	287	57	383	69	511	81	681	93	909
10	124	22	165	34	221	46	294	58	392	70	523	82	698	94	931
11	127	23	169	35	226	47	301	59	402	71	536	83	715	95	953
12	130	24	174	36	232	48	309	60	412	72	549	84	732	96	976

 $Y=10^{-2} X=10^{-1} A=10^{0} B=10^{1} C=10^{2} D=10^{3} E=10^{4} F=10^{5}$ 

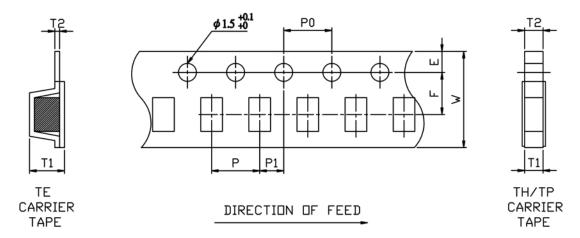
#### 10 Plating Thickness:

10.1Ni: ≥1 µ m

10.2Sn(Tin):  $\ge 3 \mu m$ 10.3Sn(Tin): Matte Sn

#### 11 Taping Specifications:

11.1 Tape Dimension

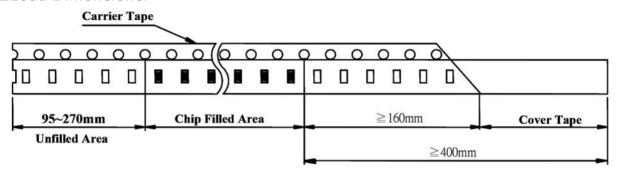




	U	nit:	mm
--	---	------	----

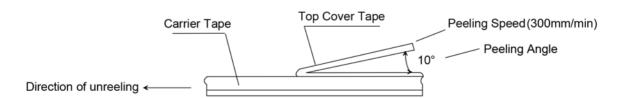
Packaging	DIM TYPE	А	В	w	Е	F	T1	T2	Р	P0	10× P0	P1
TH Carrier Tape	RTX02	1.15± 0.05	0.65± 0.05	8.0± 0.2	1.75± 0.1	3.5± 0.05	0.45+0.2/-0	0.45± 0.05	2.0± 0.1	4.0± 0.05	40.0± 0.2	2.0± 0.05
	RTX03	1.80± 0.1	1.00± 0.1	8.0± 0.2	1.75± 0.1	3.5± 0.05	0.60+0.2/-0	0.60± 0.1	4.0± 0.1	4.0± 0.05	40.0± 0.20	2.0± 0.05
TP Carrier	RTX05	2.40± 0.10	1.65± 0.10	8.0± 0.20	1.75± 0.10	3.5± 0.05	0.75+0.2/-0	0.75± 0.10	4.0± 0.10	4.0± 0.05	40.0± 0.20	2.0± 0.05
Tape	RTX06	2.30± 0.1	1.55± 0.1	8.0± 0.2	1.75± 0.1	3.5± 0.05	0.75+0.2/-0	0.75± 0.1	4.0± 0.1	4.0± 0.05	40.0± 0.20	2.0± 0.05
	RTX12	3.50± 0.2	1.90± 0.2	8.0± 0.2	1.75± 0.1	3.5± 0.05	0.75+0.2/-0	0.75± 0.1	4.0± 0.1	4.0± 0.05	40.0± 0.20	2.0± 0.05
TE	RTX20	5.50± 0.2	2.80± 0.2	12.0± 0.2	1.75± 0.1	5.5± 0.05	0.85± 0.15	0.23± 0.15	4.0± 0.1	4.0± 0.05	40.0± 0.20	2.0± 0.05
Carrier Tape	RTX25	6.70± 0.2	3.40± 0.2	12.0± 0.2	1.75± 0.1	5.5± 0.05	0.85± 0.15	0.23± 0.15	4.0± 0.1	4.0± 0.05	40.0± 0.20	2.0± 0.05

#### 11.2Lead Dimensions:



#### 11.3Cover Tape Peel off Strength

Specifications: 0402 => 0.07~0.5N (7.1~51gf) 0603 \cdot 0805 \cdot 1206 \cdot 1210 \cdot 2010 \cdot 2512=> 0.07~0.7N (7.1~71.4gf)





Unit:mm

11.4Packaging QTY:

TYPE	Tape Width	Packaging QTY (pcs/reel)											
		Paper					Plastic						
		2 mm Pitch			4 mm Pitch			4 mm Pitch					
		TH	H2	Н3	H4	TP	P2	P3	P4	TE	E2	E3	E4
RTX02	8 mm	10,000	20,000	30,000	40,000					-	-		
RTX03	8 mm												
RTX05	8 mm					5,000	10,000	15,000	20,000				
RTX06	8 mm					3,000	10,000	15,000	20,000				
RTX12	8 mm												
RTX20	12 mm									4,000	8,000	12,000	16,000
RTX25	12 mm			-						4,000	0,000	12,000	10,000
Reel	Туре	7"	10"	13"	13"	7"	10"	13"	13"	7"	10"	13"	13"

11.4.1Typical taping type: TH . TP . TE

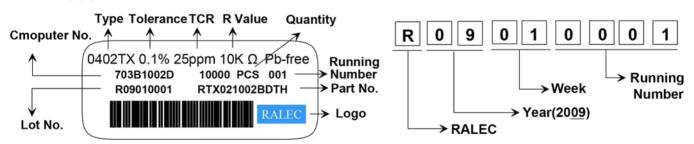
11.4.20ther taping type are upon customer's request.

#### 11.5Reel Dimensions:

M q

Reel Type/ Tape	Wa	М	Α	В	С	D
7" reel for 8 mm tape	9.0 ± 0.5	178 ± 2.0		13.5	21.0 ± 0.5	60.0 ± 1.0
7" reel for 12 mm tape	13.8 ± 0.5	178 ± 2.0				80.0 ± 1.0
10" reel for 8 mm tape	10.0 ± 0.5	254 ± 2.0		± 0.5		100.0 ± 1.0
13" reel for 8 mm tape	10.0 ± 0.5	330 ± 2.0				100.0 ± 1.0

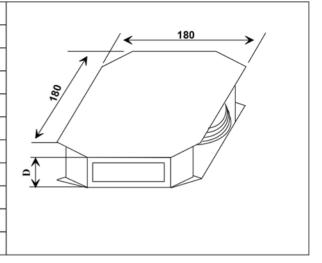
#### 11.6Label:





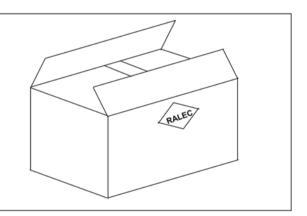
#### 11.7 Inner Box

Reel Number	D Dimension (mm)			
1	12			
2	24			
3	36			
4	48			
5	60 72			
6				
7	84			
8	96			
9	108			
10	120			



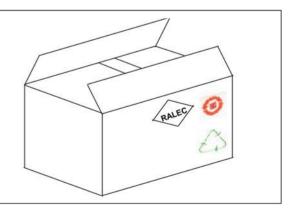
#### 11.8 Box

10R Inner Box Number	L(mm)	W(mm)	D(mm)
2	272	205	210
4	375	280	210
8	544	380	210



#### 11.9Box (For China)

10R Inner Box Number	L(mm)	W(mm)	D(mm)
2	272	205	210
4	375	280	210
8	544	380	210





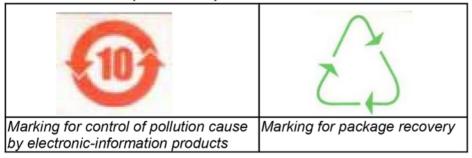
#### 12 Measurement Point

背面電極量測	Unit : mm		
A	TYPE DIM	Α	В
	RTX02	0.80 ± 0.05	0.24 ± 0.05
	RTX03	1.35± 0.05	0.35 ± 0.05
	RTX05	1.80± 0.05	0.34 ± 0.05
	RTX06	2.90± 0.05	0.35 ± 0.05
Current Terminal	RTX12	2.90 ± 0.05	0.35 ± 0.05
<ul> <li>Voltage Terminal</li> </ul>	RTX20	4.50 ± 0.05	1.15 ± 0.05
A-1	RTX25	5.90 ± 0.05	1.60 ± 0.05

#### 13 Stock period

13.1The temperature condition must be controlled at  $25 \pm 5 \, \text{°C}$ , the R.H. must be controlled at  $60 \pm 15 \text{°e}$ . The stock can maintain quality level in two years.

## 14 The carton packaged for electronic-information products is made by the symbol as follows: (For china)



# 15 For this part. It does not use the materials that include the substances specified in RoHS, the detail refer to the part of prohibition or exclusion items in RoHS (2002/95/EC).

- 1. Cadmium and cadmium compounds (permissive content <100 ppm)
- Lead and lead compounds (permissive content < 1000 ppm) Exceptions specified:
  - (1). Lead contained in the glass of cathode ray tubes, electronic components and fluorescent tubes.
  - (2). The glass material used in the electronic components, which includes resistor elements, conductive pastes (silver or copper ones), adhesives, glass frit and sealing materials.



- (3). Mercury and its mercury compounds (permissive content < 100 ppm)
- (4). Hexavalent chromium compounds (permissive content < 100 ppm)
- (5). Polybrominated biphenyls (PBB) (permissive content < 100 ppm)
- (6). Polybrominated diphenylethers (PBDE) (permissive content < 100 ppm)

#### 16 Attachments

16.1Document Revise Record Paper