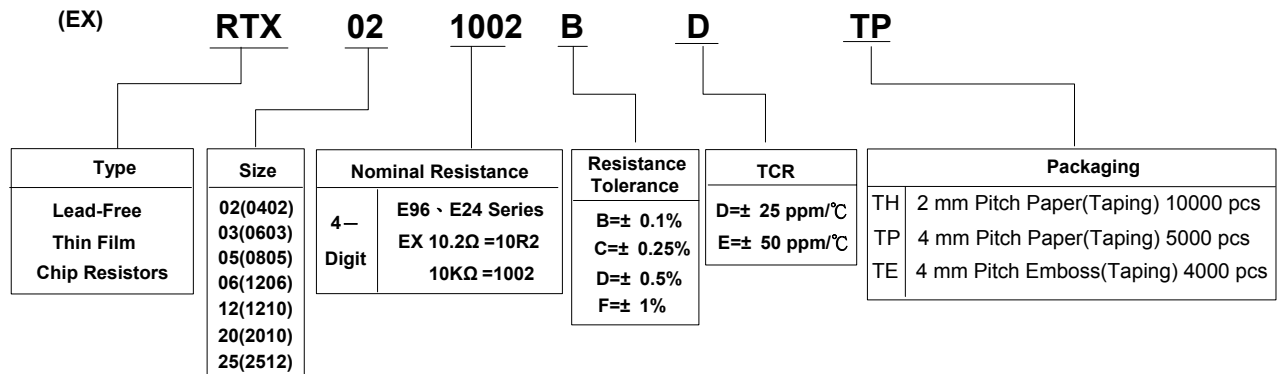


1. 范围：

本规范适用于铅无卤RTX系列薄膜芯片电阻器。

2. 部分数据的解释：

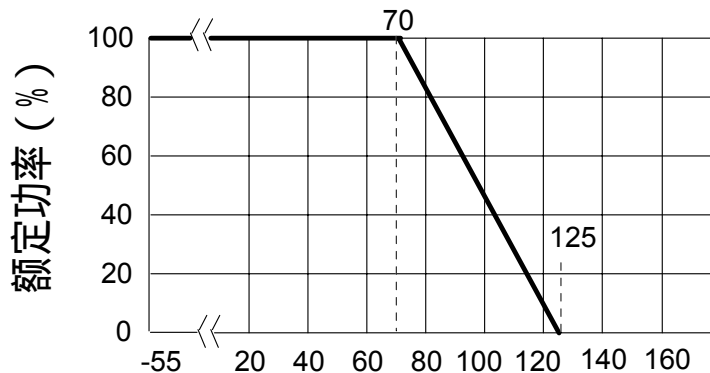


3. 一般规格：

Type	Rated Power at 70°C	Max. Working Voltage	Max. Overload Voltage	T.C.R. (ppm/°C)	Resistance Range			
					B(± 0.1%) E-96、E24	C(± 0.25%) E-96、E24	D(± 0.5%) E-96、E24	F(± 1%) E-96、E24
RTX02	$\frac{1}{16}$ -W	50V	100V	± 25	10Ω ~ 121KΩ			
				± 50				
RTX03	$\frac{1}{10}$ -W	75V	150V	± 25	10Ω ~ 681KΩ			
				± 50				
RTX05	$\frac{1}{8}$ -W	150V	300V	± 25	10Ω ~ 1.5MΩ			
				± 50				
RTX06	$\frac{1}{8}$ -W	200V	400V	± 25	10Ω ~ 1.5MΩ			
				± 50				
RTX12	$\frac{1}{4}$ -W	200V	400V	± 25	10Ω ~ 1MΩ			
				± 50				
RTX20	$\frac{1}{2}$ -W	200V	400V	± 25	10Ω ~ 1MΩ			
				± 50				
RTX25	$\frac{3}{4}$ -W	200V	400V	± 25	10Ω ~ 1MΩ			
				± 50				
Operating Temperature Range				-55°C ~ +125°C				

3.1 功率降额曲线：

工作温度范围：- 55-125，对于电阻使用的是环境温度高于70，额定功率应降级与下图一致。



3.2 额定电压：

额定电压：电阻器应当有一个直流连续工作电压或均方根。交流连续工作电压商业线频率和波形式对应的功率RA亭，确定从以下：

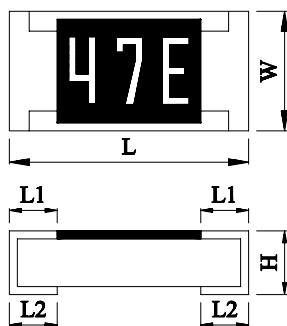
$$E = \sqrt{R \times P}$$

E=额定电压 (V)

P =额定功率 (W)

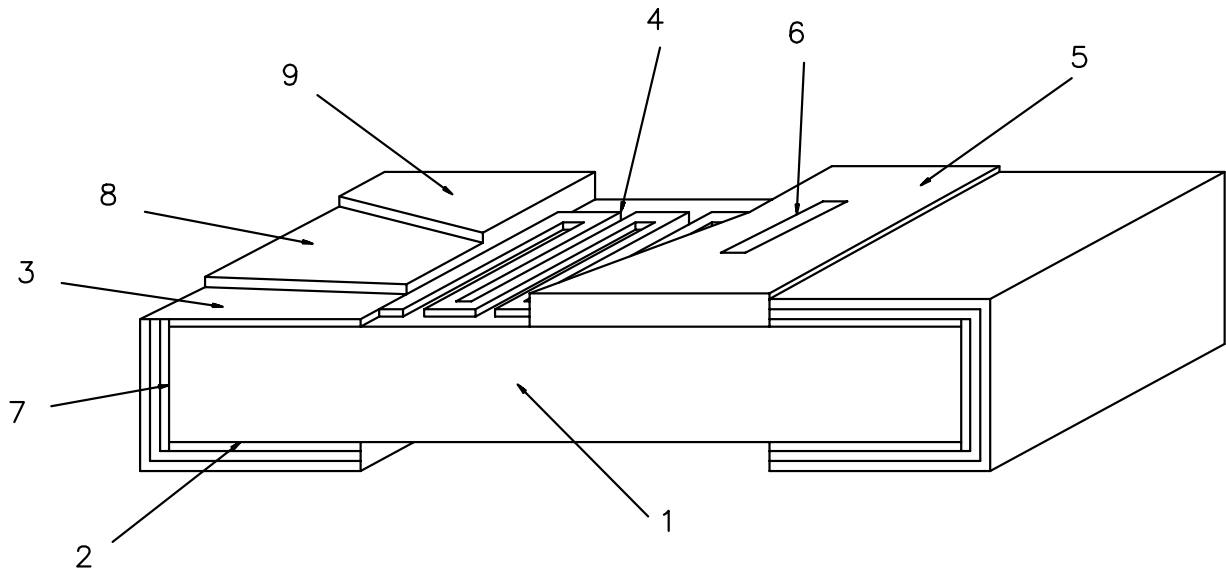
R =标称电阻 ()

3.3 尺寸：



Dimensions		L	W	H	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 ^{+0.10} _{-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

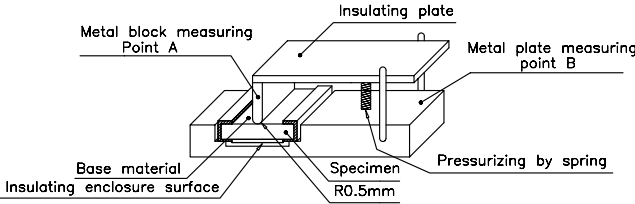
5 结构图：



1	陶瓷基板	6	记号
2	底部的内电极	7	终端内电极
3	顶部内侧电极	8	镀镍
4	电阻层	9	镀锡
5	保护涂层		

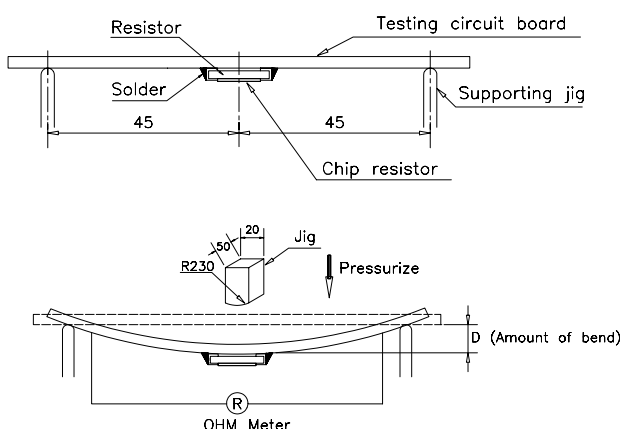
6 可靠性试验

6.1 电性能测试

ITEM	Conditions	Specifications																
		Resistors																
Temperature Coefficient of Resistance	$TCR (ppm/^{\circ}C) = \frac{(R_2 - R_1)}{R_1 (T_2 - T_1)} \times 10^6$ R1: Resistance at room temperature R2: Resistance at -55 $^{\circ}$ C or +125 $^{\circ}$ C T1: Room temperature T2: Temperature -55 $^{\circ}$ C or +125 $^{\circ}$ C Refer to JIS-C5201-1 4.8	Refer to item 3. general specifications																
Short Time Overload	Applied 2.5 times rated voltage for 5 seconds and 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	$\pm (0.5\% + 0.05 \Omega)$																
		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	$\geq 10^9 \Omega$																
																		
Dielectric Withstand Voltage	Put the resistor in the fixture, add VAC (see SPEC below) in +, - 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	No short or burned on the appearance.																
Intermittent Overload	Put the tested resistor in chamber under temperature $25 \pm 2^{\circ}C$ 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	$\pm (0.5\% + 0.05 \Omega)$																
Noise Level	Refer to JIS-C5201-1 4.12	<table border="1"> <thead> <tr> <th>Resistance</th> <th>Noise</th> </tr> </thead> <tbody> <tr> <td>$R < 100 \Omega$</td> <td>$\leq -10db(0.32 \mu V/V)$</td> </tr> <tr> <td>$100 \Omega \leq R < 1K \Omega$</td> <td>$\leq 0db(1.0 \mu V/V)$</td> </tr> <tr> <td>$1K \Omega \leq R < 10K \Omega$</td> <td>$\leq 10db(3.2 \mu V/V)$</td> </tr> <tr> <td>$10K \Omega \leq R < 100K \Omega$</td> <td>$\leq 15db(5.6 \mu V/V)$</td> </tr> <tr> <td>$100K \Omega \leq R < 1M \Omega$</td> <td>$\leq 20db(10 \mu V/V)$</td> </tr> <tr> <td>$1M \Omega \leq R$</td> <td>$\leq 30db(32 \mu V/V)$</td> </tr> </tbody> </table>			Resistance	Noise	$R < 100 \Omega$	$\leq -10db(0.32 \mu V/V)$	$100 \Omega \leq R < 1K \Omega$	$\leq 0db(1.0 \mu V/V)$	$1K \Omega \leq R < 10K \Omega$	$\leq 10db(3.2 \mu V/V)$	$10K \Omega \leq R < 100K \Omega$	$\leq 15db(5.6 \mu V/V)$	$100K \Omega \leq R < 1M \Omega$	$\leq 20db(10 \mu V/V)$	$1M \Omega \leq R$	$\leq 30db(32 \mu V/V)$
		Resistance	Noise															
$R < 100 \Omega$	$\leq -10db(0.32 \mu V/V)$																	
$100 \Omega \leq R < 1K \Omega$	$\leq 0db(1.0 \mu V/V)$																	
$1K \Omega \leq R < 10K \Omega$	$\leq 10db(3.2 \mu V/V)$																	
$10K \Omega \leq R < 100K \Omega$	$\leq 15db(5.6 \mu V/V)$																	
$100K \Omega \leq R < 1M \Omega$	$\leq 20db(10 \mu V/V)$																	
$1M \Omega \leq R$	$\leq 30db(32 \mu V/V)$																	

6.2 力学性能测试

ITEM	Conditions	Specifications														
		Resistors														
Core Body Strength	Applied test probe at its central part then pushing 10N { 1.02 Kgf } force on the sample for 10 sec. 1.RTX02、03 : probe R0.2 2.RTX05、06、12、20、25 : probe R0.5 Refer to JIS-C5201-1 4.15	$\pm (0.5\% + 0.05\Omega)$ No evidence of mechanical damage. No side conductive peel off.														
Terminal strength	Test1:The resistor mounted on the board applied 5N pushing force on the sample rear for 10 sec. Test2:The resistor mounted on the board slowly add force on the sample rear until the sample termination is breakdown. Refer to JIS-C5201-1 4.16	Test1: No evidence of mechanical damage. Test2: $\geq 5N$														
Resistance to solvent	The tested resistor be immersed into isopropyl alcohol of 20~25°C for 5± 0.5 min, then the resistor is left in the room for 48 hr, and measured its resistance variance rate. Refer to JIS-C5201-1 4.29	$\pm (0.5\% + 0.05\Omega)$ No evidence of mechanical damage, no G2 overcoating and Sn layer by leaching.														
Solderability	Preconditioning Put the tested resistor in the apparatus of PCT, at a temperature of 105°C, humidity of 100% RH, and pressure of 1.22× 10 ⁵ Pa for a duration of 4 hours. Then after left the tested resistor in room temperature for 2 hours or more. Test method: ◎Test item1 (solder pot test): The resistor be immersed into solder pot in temperature 235± 3°C for 2± 0.5 sec, then the resistor is left as placed under microscope to observed its solder area. ◎Test item2 (wetting balance method): Add flux into resistors, then put resistor into wetting balance machine, refer to condition as below, then must be measured and recorded its time changed. <table border="1" data-bbox="331 1529 1002 1854"> <thead> <tr> <th colspan="2">Testing conditions for wetting balance method with solder pot</th> </tr> <tr> <th></th> <th>Condition</th> </tr> </thead> <tbody> <tr> <td>Solder temperature</td> <td>235± 3°C</td> </tr> <tr> <td>Immersion speed</td> <td>1 to 5 mm/s</td> </tr> <tr> <td>Immersion depth</td> <td>0.10 mm</td> </tr> <tr> <td>Immersion angle</td> <td>Horizontal</td> </tr> <tr> <td>Mass of solder ball</td> <td>25mg →0402、0603 200mg →0805、1206、1210、2010、2512</td> </tr> </tbody> </table> Refer to JIS-C5201-1 4.17	Testing conditions for wetting balance method with solder pot			Condition	Solder temperature	235± 3°C	Immersion speed	1 to 5 mm/s	Immersion depth	0.10 mm	Immersion angle	Horizontal	Mass of solder ball	25mg →0402、0603 200mg →0805、1206、1210、2010、2512	1.Test item 1: Solder coverage over 95% 2.Test item 2: Zero cross time within 3 seconds.
Testing conditions for wetting balance method with solder pot																
	Condition															
Solder temperature	235± 3°C															
Immersion speed	1 to 5 mm/s															
Immersion depth	0.10 mm															
Immersion angle	Horizontal															
Mass of solder ball	25mg →0402、0603 200mg →0805、1206、1210、2010、2512															

ITEM	Conditions	Specifications
		Resistors
Resistance to soldering heat	The tested resistor be immersed into molten solder of $260 \pm 5^\circ\text{C}$ for 10 seconds. Then the resistor is left in the room for 1 hour. Refer to JIS-C5201-1 4.18	$\pm (0.5\%+0.05\Omega)$ 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  Refer to JIS-C5201-1 4.33	$\pm (0.5\%+0.05\Omega)$ No evidence of mechanical damage. No terminal peel off and core body cracked.
Leaching Test	The tested resistor be immersed into molten solder of $260 \pm 5^\circ\text{C}$ for 30 seconds. Then the resistor is left as placed under microscope to observed its solder area.	1.Solder coverage over 95%. 2.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.

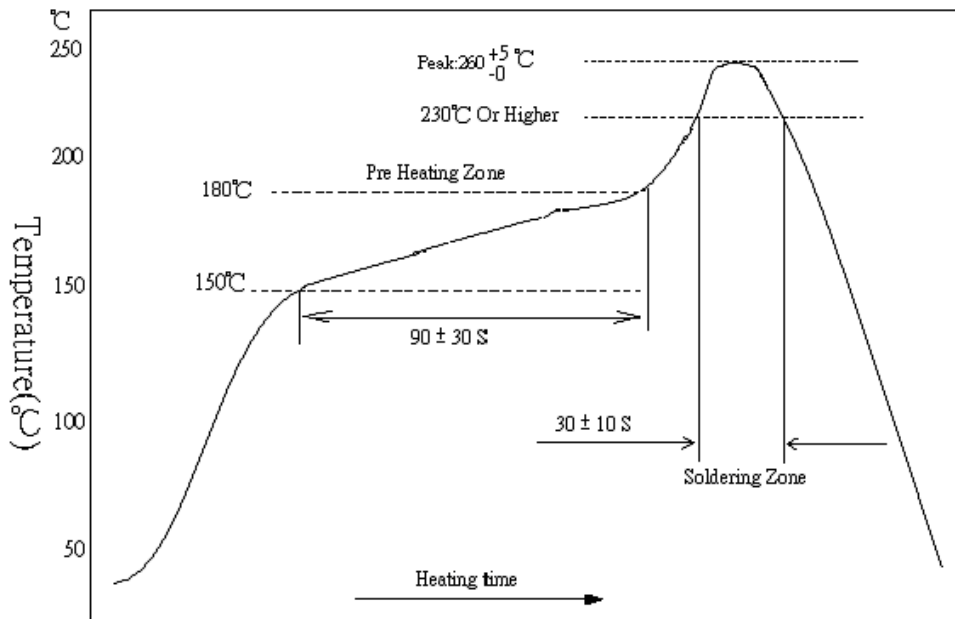
5.3 环境试验

ITEM	Conditions	Specifications								
		Resistors								
Resistance to Dry Heat	Put tested resistor in chamber under temperature $125 \pm 5^\circ\text{C}$ for 1000 +48/-0 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate. Refer to JIS-C5201-1 4.25	$\pm (0.5\% + 0.05\Omega)$								
		No evidence of mechanical damage.								
Thermal Shock	Put the tested resistor in the thermal shock chamber under the temperature cycle which shown in the following table shall be repeated 300 times consecutively. Then leaving the tested resistor in the room temperature for 1 hours, and measure its resistance variance rate. <table border="1" data-bbox="363 884 975 1075"> <thead> <tr> <th></th> <th>Testing Condition</th> </tr> </thead> <tbody> <tr> <td>Lowest Temperature</td> <td>$-55 \pm 5^\circ\text{C}$</td> </tr> <tr> <td>Highest Temperature</td> <td>$125 \pm 5^\circ\text{C}$</td> </tr> <tr> <td>Temperature-retaining time</td> <td>15 minutes each</td> </tr> </tbody> </table> Refer to MIL-STD 202 Method 107		Testing Condition	Lowest Temperature	$-55 \pm 5^\circ\text{C}$	Highest Temperature	$125 \pm 5^\circ\text{C}$	Temperature-retaining time	15 minutes each	$\pm (0.5\% + 0.05\Omega)$
			Testing Condition							
Lowest Temperature	$-55 \pm 5^\circ\text{C}$									
Highest Temperature	$125 \pm 5^\circ\text{C}$									
Temperature-retaining time	15 minutes each									
		No evidence of mechanical damage.								
Loading Life in Moisture	Put the tested resistor in the chamber under temperature $40 \pm 2^\circ\text{C}$, relative humidity 90~95% and load the rated voltage for 90 minutes on, 30 minutes off, total 1000 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate. Refer to JIS-C5201-1 4.24	$\pm (0.5\% + 0.05\Omega)$								
		No evidence of mechanical damage.								
Load Life	Put the tested resistor in chamber under temperature $70 \pm 2^\circ\text{C}$ and load the rated voltage for 90 minutes on, 30 minutes off, total 1000 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate. Refer to JIS-C5201-1 4.25	$\pm (0.5\% + 0.05\Omega)$								
		No evidence of mechanical damage.								
Low Temperature Operation	Put the tested resistor in the chamber at room temperature 25°C . Decreasing the temperature to -55°C and keep the temperature at -55°C for 1 hour. Then load the rated voltage for 45 minutes on, and 15 minutes off. Then leaving the tested resistor in room temperature for 8 ± 1 hours, and measure its resistance variance rate. Refer to MIL-R-55342D 4.7.4	$\pm (0.5\% + 0.05\Omega)$								
		No evidence of mechanical damage.								
Whisker Test	◎Test item 1 (Thermal Shock test): <table border="1" data-bbox="363 1758 975 1937"> <tbody> <tr> <td>Minimum storage temperature</td> <td>$-40 \pm 2^\circ\text{C}$</td> </tr> <tr> <td>Maximum storage temperature</td> <td>$85 \pm 2^\circ\text{C}$</td> </tr> <tr> <td>Temperature-retaining time</td> <td>7 min.</td> </tr> <tr> <td>Number of temperature cycles</td> <td>1,500</td> </tr> </tbody> </table>	Minimum storage temperature	$-40 \pm 2^\circ\text{C}$	Maximum storage temperature	$85 \pm 2^\circ\text{C}$	Temperature-retaining time	7 min.	Number of temperature cycles	1,500	Max. $50 \mu\text{m}$
	Minimum storage temperature	$-40 \pm 2^\circ\text{C}$								
Maximum storage temperature	$85 \pm 2^\circ\text{C}$									
Temperature-retaining time	7 min.									
Number of temperature cycles	1,500									

ITEM	Conditions	Specifications						
		Resistors						
	<p>◎Test item 2 (Constant temperature/humidity test):</p> <table border="1"> <tr> <td>Temperature</td> <td>85°C</td> </tr> <tr> <td>Humidity</td> <td>85%</td> </tr> <tr> <td>Testing duration</td> <td>500± 4 hours</td> </tr> </table> <p>◎Inspection: Inspect for whisker formation on specimens that underwent the acceleration test specified in subclause 4.2, with a magnifier (stereo microscope) of about 40 or higher magnification. If judgment is hard in this method, use a scanning electron microscope (SEM) of about 1,000 or higher magnification.</p>	Temperature	85°C	Humidity	85%	Testing duration	500± 4 hours	
Temperature	85°C							
Humidity	85%							
Testing duration	500± 4 hours							

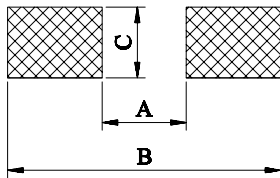
7 推荐的焊接方法

7.1 无铅回流焊温度曲线



7.2 烙铁：恒温350 ± 10 ，停留时间应小于3秒。

8 所有国家的模式设计(回流焊) : (mm)



DIM TYPE	A	B	C
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 标记图：

9.1 RTX05、06、12、20、25 ± 0.1%、± 0.25%、± 0.5%、± 1%的公差

9.1.1.1 电阻范围 < 100 : 在E-24系列或E-96系列4位数，前三位有效数字，第四位数乘法器 (10 *)。

《EX》 Marking → 1002

$$1002 = 100 \times 10^2 = 10000 \Omega = 10K \Omega$$

9.1.1.2 电阻范围 < 100 : 在E-24系列或E-96系列4位数字，三位数字有效数字位数，R乘法器 (10 *)。

《EX》 Marking → 10R2 ,R digit is multiplier (10⁻¹).

$$10R2 = 102 \times 10^{-1} = 10.2 \Omega$$

Marking → 1R02 ,R digit is multiplier (10⁻²).

$$1R02 = 102 \times 10^{-2} = 1.02 \Omega$$

9.2 RTX03 ± 0.1%、± 0.25%、± 0.5%、± 1% 的公差：
为EIAJ-96标记。

《EX》 Marking → 47B

$$47B = 301 \times 10^1 = 3010 \Omega = 3.01K \Omega$$

工作表现

如果电阻不E-96系列和E-24系列 ,这也许E-24系列和一个短杆标记信。

R value > 100Ω : marking 391 391 = 39 × 10¹ = 390 Ω

R value < 100Ω : marking 390 390 = 39 × 10⁰ = 39 Ω

9.3 RTX02没有标记

9.4 EIAJ-96 标记：

此表显示前两位数三位EIAJ-96部分标记方案。第三个字符是字母乘数：

Code	Ω	Code	Ω	Code	Ω	Code	Ω	Code	Ω	Code	Ω	Code	Ω	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=10⁰ B=10¹ C=10² D=10³ E=10⁴ F=10⁵

10 镀层厚度：

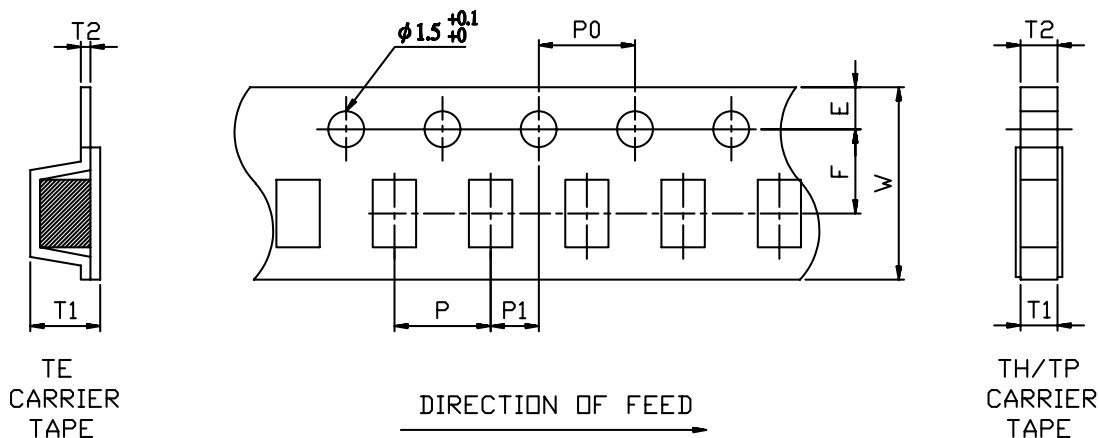
10.1Ni: ≥1 μm

10.2Sn(Tin): ≥3 μm

10.3Sn(Tin): Matte Sn

11 磁带规格：

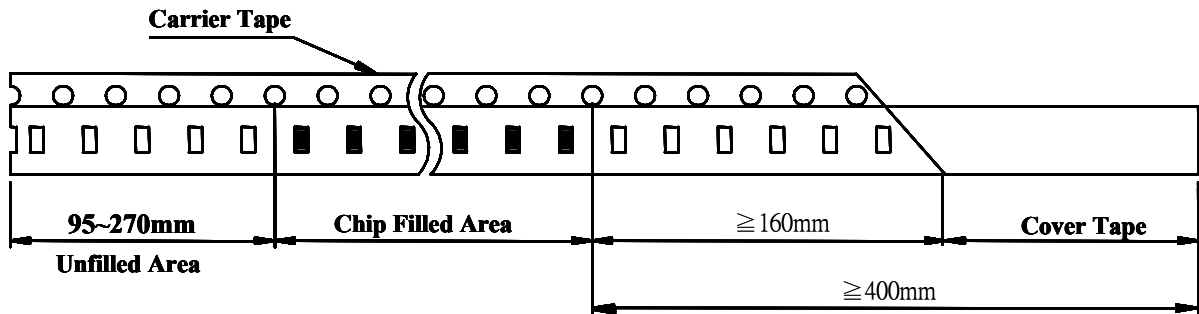
11.1 磁带尺寸



单位：毫米

Packaging	DIM TYPE	A	B	W	E	F	T1	T2	P	P0	10x 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
TP Carrier Tape	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
	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
	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 Carrier Tape	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
	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

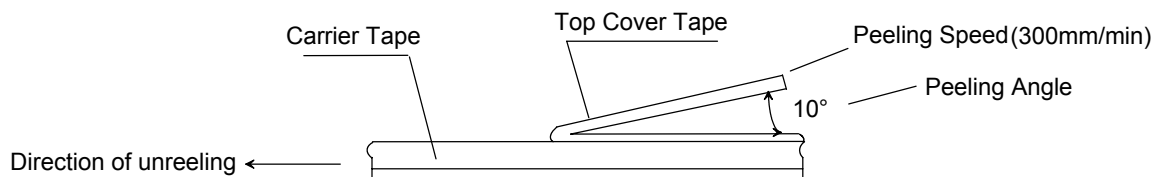
11.2引线的尺寸：



11.3封面磁带剥离剥离强度

规格：0402 => 0.07 ~ 0.5N (7.1 ~ 51gf)

0603、0805、1206、1210、2010、2512=> 0.07~0.7N (7.1~71.4gf)



11.4 包装数量：

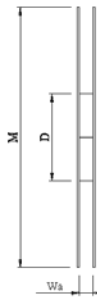
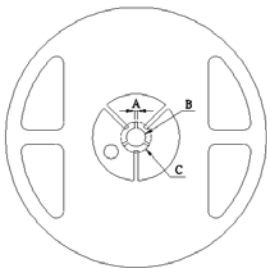
TYPE	Tape Width	Packaging QTY (pcs/reel)											
		Paper								Plastic			
		2 mm Pitch				4 mm Pitch				4 mm Pitch			
		TH	H2	H3	H4	TP	P2	P3	P4	TE	E2	E3	E4
RTX02	8 mm	10,000	20,000	30,000	40,000	--	--	--	--	--	--	--	--
RTX03	8 mm	--	--	--	--	5,000	10,000	15,000	20,000	--	--	--	--
RTX05	8 mm												
RTX06	8 mm												
RTX12	8 mm												
RTX20	12 mm	--	--	--	--	--	--	--	--	4,000	8,000	12,000	16,000
RTX25	12 mm	--	--	--	--	--	--	--	--	4,000	8,000	12,000	16,000
Reel Type		7"	10"	13"	13"	7"	10"	13"	13"	7"	10"	13"	13"

11.4 典型的磁带类型：TH、TP、TE

11.4 其他磁带类型是根据客户的要求。

11.5 卷轴尺寸：

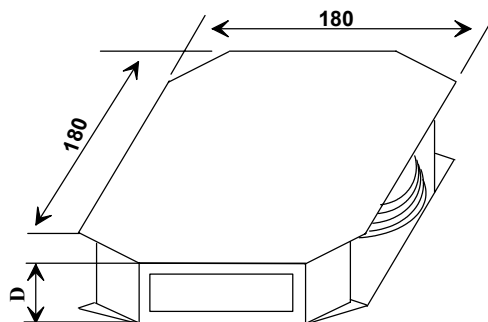
单位：毫米



Reel Type/ Tape	Wa	M	A	B	C	D
7" reel for 8 mm tape	9.0 ± 0.5	178 ± 2.0	2.0 ± 0.5	13.5 ± 0.5	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				100.0 ± 1.0
13" reel for 8 mm tape	10.0 ± 0.5	330 ± 2.0				100.0 ± 1.0

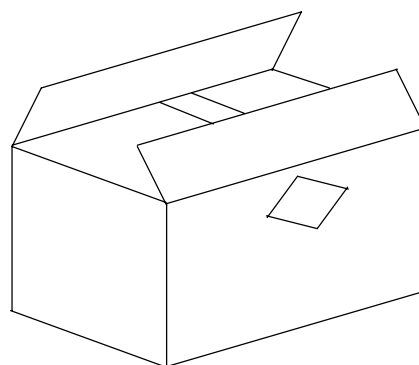
11.7 内箱

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



11.8箱

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



11.9箱 (中国)

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

