

Specification

Title: **FIXED THIN FILM CHIP RESISTORS;
RECTANGULAR TYPE**

Style: **RNC10, 16**

RoHS COMPLIANCE ITEM
Halogen and Antimony Free

Product specification contained in this specification
are subject to change at any time without notice
If you have any questions or a Purchasing Specification for any quality
Agreement is necessary, please contact our sales staff.



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Note: Stock conditions

Temperature: +5°C ~ +35°C

Relative humidity: 25% ~ 75%

The period of guarantee: Within 2 year from shipment by the company.

Solderability shall be satisfied.

1. Scope

1.1 This specification covers the detail requirements for fixed thin film chip resistors; rectangular type & precision, style of RNC10,16.

1.2 Applicable documents

JIS C 5201-1: 1998, IEC60115-8: 1989 Amendment 1: 1992,


2. Classification

Type designation shall be the following form.

(Example)

RNC	16	E	1002	B	TP
1	2	3	4	5	6

 Style

1 Fixed thin film chip resistors; rectangular type  Style

2 Size

3 Temperature coefficient of resistance

E	$\pm 25 \times 10^{-6} / ^\circ\text{C}$
C	$\pm 50 \times 10^{-6} / ^\circ\text{C}$

4 Rated resistance Example; 1002 \rightarrow 10k Ω

5 Tolerance on rated resistance

6 Packaging form

3. Rating

3.1 The ratings shall be in accordance with Table-1.

Table-1

Style	Rated dissipation (W)	Temperature coefficient of resistance ($10^{-6}/^\circ\text{C}$)	Rated resistance range(Ω)	Preferred number series for resistors	Tolerance on rated resistance
RNC10	0.063	E: ± 25 C: ± 50	10~100k	E24,96	B($\pm 0.1\%$) C($\pm 0.25\%$) D($\pm 0.5\%$)
RNC16	0.063	E: ± 25 C: ± 50	10~100k	E24,96	B($\pm 0.1\%$) C($\pm 0.25\%$) D($\pm 0.5\%$)

Style	Limiting element voltage (V)	Max. Overload voltage(V)	Category temperature range($^\circ\text{C}$)
RNC10	25	50	-55~+155
RNC16	50	100	

3.2 Derating

The derated values of dissipation at temperature in excess of 70°C shall be as indicated by the following curve.

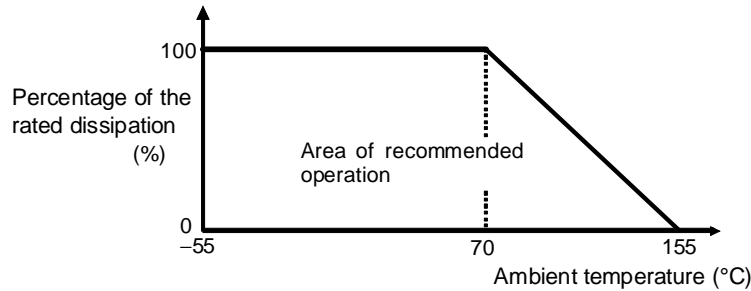


Figure-1 Derating curve

3.3 Rated voltage

d.c.or a.c.r.m.s.voltage calculated from the square root of the product of the rated resistance and the rated dissipation.

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

E: Rated voltage (V)

P: Rated dissipation (W)

R: Rated resistance (Ω)

Limiting element voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.

At high value of resistance, the rated voltage may not be applicable.

4. Packaging form

The standard packaging form shall be in accordance with Table-2.

Table-2

Symbol	Packaging form		Standard packaging quantity / units	Application
B	Bulk (loose package)		1,000 pcs.	RNC10, 16
TH	Paper taping	8mm width, 2mm pitches	10,000 pcs.	RNC10
TP	Paper taping	8mm width, 4mm pitches	5,000 pcs.	RNC16

5. Dimensions

5.1 The resistor shall be of the design and physical dimensions in accordance with Figure-2 and Table-3.

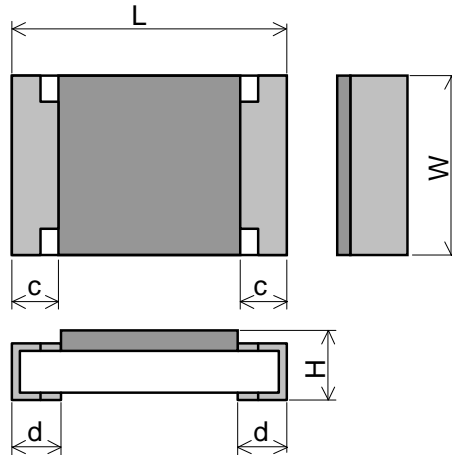


Figure-2

Table-3

Unit: mm

Style	L	W	H	c	d
RNC10	1.0±0.05	0.5±0.05	0.35±0.05	0.2±0.1	0.25±0.10
RNC16	1.55±0.10	0.8±0.1	0.45±0.15	0.25±0.15	0.3±0.15

6. Marking

The Rated resistance of RNC10 should not be marked.

6.1 RNC16

The nominal resistance shall be marked in 3 digits (E24 and/or E96) and marked on over coat side.

In case of the resistance value that E96 overlaps with E24, there is a case to mark in E96.

Marking example	Contents	Application
123	$12 \times 10^3 [\Omega] \rightarrow 12 [\text{k}\Omega]$	E24
2R2	2.2 $[\Omega]$	E24
02C	$102 \times 10^2 [\Omega] \rightarrow 10.2 [\text{k}\Omega]$	E96
51X	33.2 $[\Omega]$	E96

6.1.1 Symbol for E96 series of resistance value

E96	Symbol	E96	Symbol	E96	Symbol	E96	Symbol	E96	Symbol
100	01	162	21	261	41	422	61	681	81
102	02	165	22	267	42	432	62	698	82
105	03	169	23	274	43	442	63	715	83
107	04	174	24	280	44	453	64	732	84
110	05	178	25	287	45	464	65	750	85
113	06	182	26	294	46	475	66	768	86
115	07	187	27	301	47	487	67	787	87
118	08	191	28	309	48	499	68	806	88
121	09	196	29	316	49	511	69	825	89
124	10	200	30	324	50	523	70	845	90
127	11	205	31	332	51	536	71	866	91
130	12	210	32	340	52	549	72	887	92
133	13	215	33	348	53	562	73	909	93
137	14	221	34	357	54	576	74	931	94
140	15	226	35	365	55	590	75	953	95
143	16	232	36	374	56	604	76	976	96
147	17	237	37	388	57	619	77		
150	18	243	38	392	58	634	78		
154	19	249	39	402	59	649	79		
158	20	255	40	412	60	665	80		

6.1.2 Symbol of multipliers

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

7. Performance

7.1 The standard condition for tests shall be in accordance with Sub-clause 4.2, JIS C 5201-1: 1998.

7.2 The performance shall be satisfied in Table-4.

Table-4(1)

No.	Test items	Condition of test (JIS C 5201-1)	Performance requirements		
1	Resistance	Sub-clause 4.5	As in 4.5.2 The resistance value shall correspond with the rated resistance taking into account the specified tolerance.		
2	Temperature characteristic of resistance	4.8 Natural resistance change per change in degree centigrade. $TCR(10^{-6}/\Omega) = \frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6$ R1 : Resistance at t1 temperature R2 : Resistance at t2 temperature t1 : 20°C $^{+5}_{-1}$ °C, t2: 155°C $^{+5}_{-1}$ °C	See Table-1.		
3	Short time overload	4.13 The applied voltage: 2.5 times the rated voltage Test period: 5s Test potential should not exceed max. overload voltage as shown in Table-1.	$\Delta R/R$: Within $\pm(0.2\%+0.05\Omega)$		
4	Resistance to soldering heat	4.18 Test by a piece. Temp. of solder bath: 260 \pm 5°C Immersion time: 10 \pm 1s After immersion into solder, leaving at the room temp. for 1h or more and then measure the resistance.	$\Delta R/R$: Within $\pm(0.1\%+0.05\Omega)$ No evidence of appearance damage.		
5	Solderability	4.17 Test by a piece Flux: Rosin-Methanol Temp. of solder bath: 235 \pm 5°C Immersion time: 2 \pm 0.5s	The surface of terminal immersed shall be min. of 95% covered with a new coating of solder. No evidence of appearance damage.		
6	Temperature cycling	4.19 Test cycle: 5 cycles for duty cycle as specified below.	$\Delta R/R$: Within $\pm(0.25\%+0.05\Omega)$ No evidence of appearance damage.		
		Step		Temperature(°C)	Time(min)
		1		-55 \pm 3	30
		2		20 $^{+5}_{-1}$	2-3
		3		+155 \pm 2	30
4	20 $^{+5}_{-1}$	2-3			
7	Load life	4.25 Test temp.: 70 \pm 2°C Test voltage: Cycle of 1h 30min "ON" and 30min "OFF" at dc rated voltage. Test period: 1,000 $^{+48}_{0}$ h	$\Delta R/R$: Within $\pm(0.5\%+0.05\Omega)$		

Table-4(2)

No	Test items	Condition of test (JIS C 5201-1)	Performance requirements
8	Load life in humidity	4.24 Test temp. & relative humidity : $40 \pm 2^\circ\text{C}$ & 90-95% R.H. Test voltage: Cycle of 1h 30min "ON" and 30min "OFF" at dc rated voltage. Test period: $1,000^{+48}_0$ h	$\Delta R/R$: Within $\pm(0.5\%+0.05\Omega)$
9	Substrate bending test	4.33 Bent value: 3 mm (Among the fulcrums: 90mm) Duration: 10s Test substrate: Epoxide woven glass	$\Delta R/R$: Within $\pm(0.1\%+0.05\Omega)$
10	Adhesion	4.32 Force: 5 N Duration: $10 \text{ s} \pm 1 \text{ s}$	No remarkable damage or removal of the terminations
11	Insulation resistance	4.6 Test voltage: Max. Overload voltage(DC) Test period: 1 min.	$R \geq 10\text{G}\Omega$
12	Dielectric withstanding voltage	4.7 Test voltage: Max. Overload voltage(AC) Test period: 1 min.	No flashover, fire and breakdown.

8. Taping

8.1 Paper taping (8mm width, 2mm pitches)

Taping dimensions shall be in accordance with Figure-3 and Table-5.

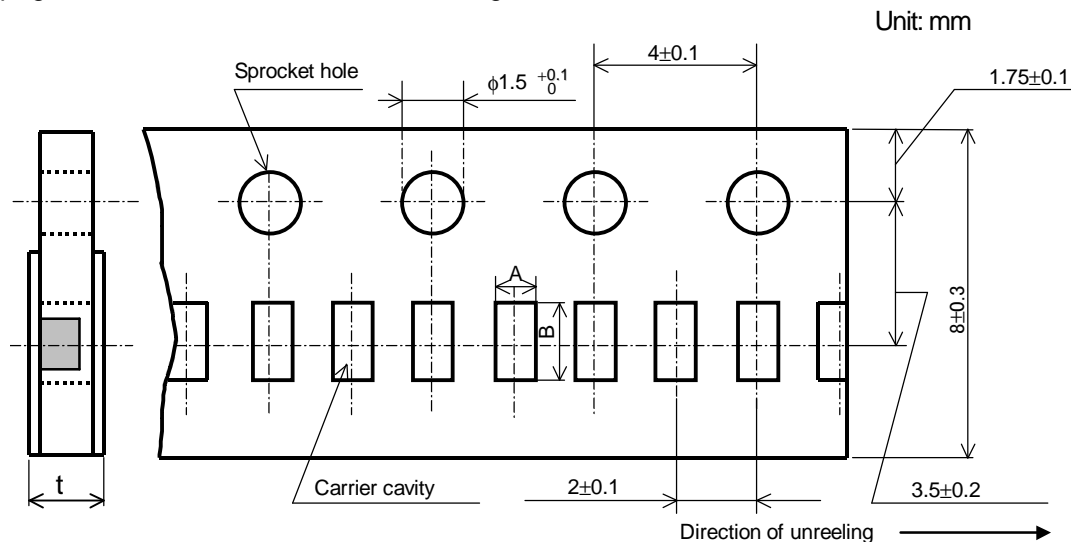


Figure-3

Table-5

Unit: mm

Style	A	B	t
RNC10	0.7 ± 0.1	1.2 ± 0.1	0.4 ± 0.05

8.2 Paper taping (8mm width, 4mm pitches)

Taping dimensions shall be in accordance with Figure-4 and Table-6.

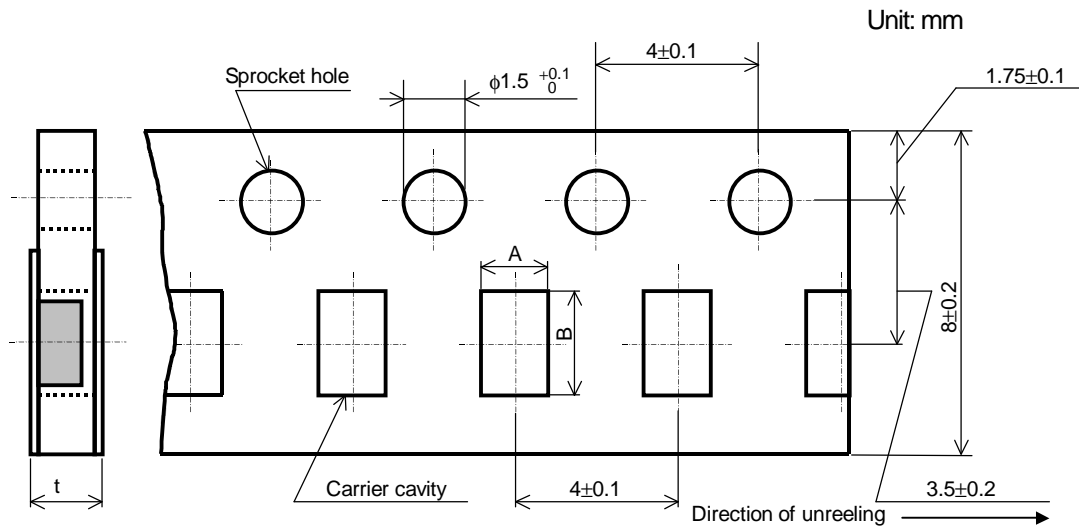


Figure-4

Table-6

Unit: mm

Style	A	B	t
RNC16	1.1 ± 0.2	1.9 ± 0.2	0.65 ± 0.05

8.3 Reel dimension

Reel dimensions shall be in accordance with the following Figure-5.

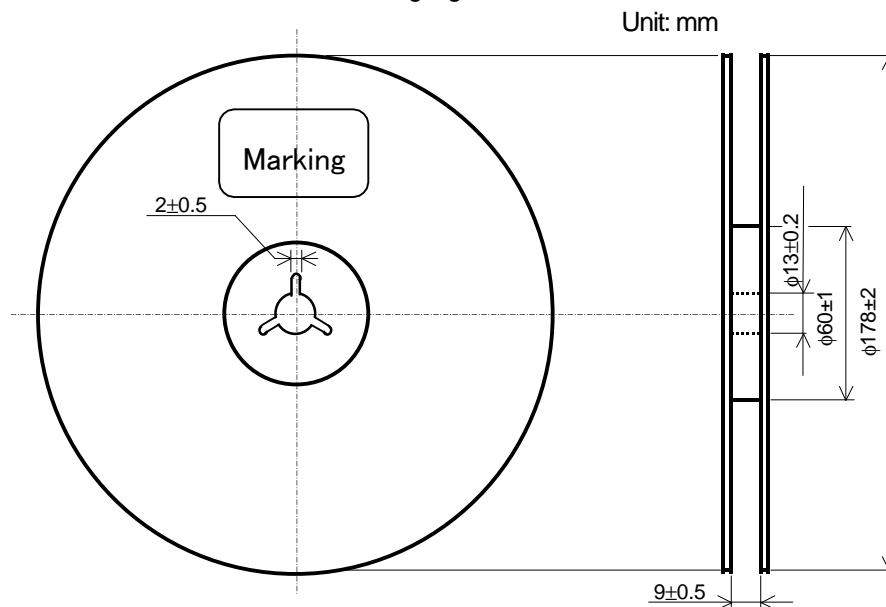


Figure-5

9. Marking on package

The label of a minimum package shall be legibly marked with follows.

- (1) Classification (Style, Temperature coefficient of resistance, Rated resistance, Tolerance on rated resistance, Packaging form)
- (2) Quantity (3) Lot number (4) Manufacturer's name or trade mark (5) Others