Spec. No.: RNC-K-HTS-0001 /10

Date: 2017. 1. 10

# Specification

Title: FIXED THIN FILM CHIP RESISTORS;

**RECTANGULAR TYPE** 

Style: RNC06, 20, 32

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.



Hokkaido Research Center Approval by: T. Sannomiya Drawing by: M. Shibuya

Note: Stock conditions

Temperature:  $+5^{\circ}$ C ~  $+35^{\circ}$ C Relative humidity: 25% ~ 75%

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

Solderability shall be satisfied.

Drawing No: RNC-K-HTS-0001 /10

Title: FIXED THIN FILM CHIP RESISTORS; RECTANGULAR TYPE

RNC06, 20, 32 Page: 1/12

#### 1. Scope

1.1 This specification covers the detail requirements for fixed thin film chip resistors; rectangular type & precision, style of RNC06, 20, 32.

#### 1.2 Applicable documents

JIS C 5201–1:2011, JIS C 5201–8: 2014, JIS C 5201–8–1: 2014 IEC60115–1: 2008, IEC60115–8: 2009, IEC60115–8–1: 2014 EIAJ RC-2133C-2010

#### 2. Classification

Type designation shall be the following form.

(Example)

1 Fixed thin film chip resistors; rectangular type \_\_\_\_\_\_ Stv

2 Size

3 Temperature coefficient of resistance

Е	±25×10 <sup>6</sup> / °C
С	±50×10 <sup>6</sup> / °C

4 Rated resistance Example;  $1002 \rightarrow 10 \text{k}\Omega$ 

	1 /	
103	E24 Series, 3 digit,	Ex. 103> $10$ kΩ,
1002	E96 Series, 4 digit,	Ex. 1002>10kΩ
		10R2> 10.2kΩ

5 Tolerance on rated resistance

В	±0.1%
С	±0.25%
D	±0.5%
F	±1%

#### 6 Packaging form

В	Bulk (loose package)
PA	Press pocket taping
TP	Paper taping

RNC06, 20, 32 Page: 2/12

#### 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/°C)	Rated resistance range( $\Omega$ )	Preferred number series for resistors	Tolerance on rated resistance
DNCoc	0.05	E: ±25 C: ±50	100~12k		B(±0.1%)
RNC06	0.05	E: ±25	27~12k	E24,96	D(.0.50/) E(.10/)
		C: ±50	27~22k		D(±0.5%),F(±1%)
RNC20	0.1		100~130k	L24,50	B(±0.1%)
KING20 U.1	0.1	F 25	10~130k		C(±0.25%), D(±0.5%)
RNC32	0.125	E: ±25	100~180k		B(±0.1%)
RINGSZ	0.125		10~180k		C(±0.25%), D(±0.5%)

Style	Limiting element	Isolation Voltage	Category temperature
Style	voltage (V)	(V)	range(°C)
RNC06	15	50	
RNC20	100	100	-55~+155
RNC32	200	100	

#### 3.2 Climatic category

55/125/56 Lower category temperature -55 °C
Upper category temperature +155 °C
Duration of the damp heat, steady state test 56days

Duration of the damp heat, steady state test 500

#### 3.3 Stability class

1% Limits for change of resistance:

- for long - term tests  $\pm (1.0\% + 0.05\Omega)$ - for short - term tests  $\pm (0.25\% + 0.05\Omega)$ 

#### 3.4 Derating

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

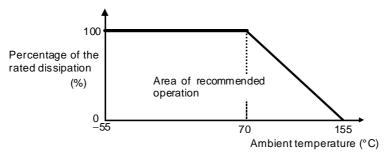


Figure-1 Derating curve

Drawing No: RNC-K-HTS-0001 /10

Title: FIXED THIN FILM CHIP RESISTORS; RECTANGULAR TYPE

RNC06, 20, 32 Page: 3/12

#### 3.5 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 ( $\Omega$ )

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
В	Bulk (loose package)		1,000 pcs.	RNC06, 20, 32
PA	Press pocket taping (paper taping) 8mm width, 2mm pitches		15,000 pcs.	RNC06
TP	Paper taping	8mm width, 4mm pitches	5,000 pcs.	RNC20, 32

#### 5. Dimensions

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

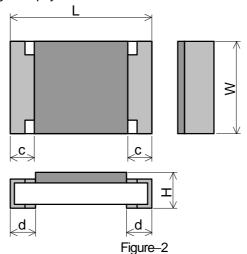


Table-3 Unit: mm

Style	L	W	Н	С	d
RNC06	0.6±0.03	0.3±0.03	0.23±0.03	0.1±0.05	0.15±0.05
RNC20	2.0±0.15	1.25 <sup>+0.10</sup> <sub>-0.05</sub>	0.6±0.1	0.4±0.2	$0.3^{+0.2}_{-0.1}$
RNC32	3.1±0.1	1.55 <sup>+0.10</sup> <sub>-0.05</sub>	0.6±0.1	0.45±0.20	0.3 +0.2

#### 5.2 Net weight (Reference)

Style	Net weight(mg)	
RNC06	0.16	
RNC20	5	
RNC32	9	



Drawing No: RNC-K-HTS-0001 /10

FIXED THIN FILM CHIP RESISTORS; RECTANGULAR TYPE

RNC06, 20, 32 Page: 4/12

#### 6. Marking

The Rated resistance shall be marked in 3 digits (E24) or 4 digits (E96) and marked on over coat side.

• E24 series: 3 digits, E96 series: 4 digits

In case of the resistance value that E96 overlaps with E24, It is marked by either.

The Rated resistance of RNC06 should not be marked.

Marking example	Contents	Application
123	$12\times10^3 \ [\Omega] \rightarrow 12 \ [k\Omega]$	RNC20,32
12R7	12.7 [Ω]	E96, Less than 100Ω of RNC20,32
5623	$562 \times 10^3 [\Omega] \rightarrow 562 [k\Omega]$	RNC20,32

#### 7. Performance

- 7.1 The standard condition for tests shall be in accordance with Sub-clause 4.2, JIS C 5201-1: 2011.
- 7.2 The performance shall be satisfied in Table-4.

Table-4(1)

No.	Test items	Condition of test (IIS C 5201 1)	Performance requirements
		Condition of test (JIS C 5201–1)	Performance requirements
1	Visual examination	Sub-clause 4.4.1	As in 4.4.1
		Checked by visual examination.	The marking shall be legible, as
			checked by visual examination.
2	Dimension	Sub-clause 4.4.2	As specified in Table-3 of this
			specification.
	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.
3	Voltage proof	Sub-clause 4.7	No breakdown or flash over
		Method: 4.6.1.4(See Figure–5)	
		Test voltage: Alternating voltage with a peak	
		value of 1.42 times the insulation voltage.	
		Duration: $60 \text{ s} \pm 5 \text{ s}$	
		Insulation resistance	R≥1GΩ
		Test voltage: Insulation voltage	
		Duration: 1 min.	
4	Solderability	Sub-clause 4.17	As in 4.17.4.5
		Without ageing	The terminations shall be covered
		Flux: The resistors shall be immersed in a	with a smooth and bright solder
		non-activated soldering flux for 2s.	coating.
		Bath temperature: 235 °C ± 5 °C	
		Immersion time: $2 s \pm 0.5 s$	

Drawing No: RNC-K-HTS-0001 /10

FIXED THIN FILM CHIP RESISTORS; RECTANGULAR TYPE

RNC06, 20, 32 Page: 5/12

#### Table-4(2)

No	Test items	Condition of test (JIS C 5201–1)	Performance requirements
5	Mounting	Sub-clause 4.31	
		Substrate material: Epoxide woven glass	
		Test substrate: Figure–3	
	Overload	Sub-clause 4.13	
	(in the mounted state)	The applied voltage shall be 2.5 times the	
		rated voltage or twice the limiting element	
		voltage, whichever is the less severe.	
		Duration: 2 s	Nie Zelie de como
		Visual examination	No visible damage
	Calvert resistance of the	Resistance	$\Delta R \le \pm (0.25\% + 0.05\Omega)$
	Solvent resistance of the	Sub-clause 4.30	Legible marking
	marking	Solvent: 2-propanol	
		Solvent temperature: 23 °C ± 5 °C	
		Method 1	
		Rubbing material: cotton wool	
	1.0	Without recovery	
6	Mounting	Sub-clause 4.31	
		Substrate material: Epoxide woven glass	
	Dound atraneth of the and face	Test substrate: Figure–4	
	Bound strength of the end face plating	Sub-clause 4.33	
	plating	Bent value: 3 mm	$\Delta R \le \pm (0.25\% + 0.05\Omega)$
	Final measurements	Resistance	$\Delta I \setminus \Sigma \pm (0.257670.0052)$
	T marmoacaromento	Sub-clause 4.33.6	No visible damage
7	Resistance to soldering heat	Visual examination Sub-clause 4.18	110 Violoto darriago
'	Resistance to soldering heat	Solder temperature: 260 °C ± 5 °C	
		Immersion time: 10 s ± 0.5 s	
		Visual examination	As in 4.18.3.4
		VISUAI EAAITIII IAUOTT	No sign of damage such as cracks.
		Resistance	$\Delta R \le \pm (0.25\% + 0.05\Omega)$
	Component solvent resistance	Sub-clause 4.29	
	,	Solvent: 2-propanol	
		Solvent temperature: 23 °C ± 5 °C	
		Method 2	
		Recovery: 48 h	
		Visual examination	No visible damage
		Resistance	$\Delta R \le \pm (0.25\% + 0.05\Omega)$

Drawing No: RNC-K-HTS-0001 /10

FIXED THIN FILM CHIP RESISTORS; RECTANGULAR TYPE

RNC06, 20, 32 Page: 6/12

Table-4(3)

No	Test items	Condition of test (JIS C 5201–1)	Performance requirements
8	Mounting	Sub-clause 4.31	
		Substrate material: Epoxide woven glass	
	A dhaaian	Test substrate: Figure–3	
	Adhesion	Sub-clause 4.32	
		Force: 5 N (RNC06: 3N)	
		Duration: 10 s ± 1 s	No visible damage
	Rapid change temperature	Visual examination	110 Violote dai riage
	rapid on angeneric peraname	Sub-clause 4.19	
		Lower category temperature: –55 °C Upper category temperature: +155 °C	
		Duration of exposure at each temperature: 30	
		min.	
		Number of cycles: 5 cycles.	
		Visual examination	No visible damage
		Resistance	$\Delta R \le \pm (0.25\% + 0.05\Omega)$
9	Climatic sequence	Sub-clause 4.23	
	-Dry heat	Sub-clause 4.23.2	
		Test temperature: + 155 °C	
	5	Duration: 16 h	
	-Damp heat, cycle	Sub-clause 4.23.3	
	(12+12hour cycle) First cycle	Test method: 2	
	First cycle	Test temperature: 55 °C [Severity(2)]	
	-Cold	Sub-clause 4.23.4	
	3014	Test temperature –55 °C	
		Duration: 2h	
	-Damp heat, cycle	Sub-clause 4.23.6	
	(12+12hour cycle)	Test method: 2	
	Remaining cycle	Test temperature: 55 °C	
		[Severity (2)]	
	D.C. load	Number of cycles: 5 cycles	
	–D.C. load	Sub-clause 4.23.7	
		The applied voltage shall be the rated voltage or the limiting element voltage whichever is	
		the smaller.	
		Duration: 1 min.	
		Visual examination	No visible damage
		Resistance	$\Delta R \le \pm (1\% + 0.05\Omega)$
10	Mounting	Sub-clause 4.31	
		Substrate material: Epoxide woven glass	
	F. J	Test substrate: Figure-3	
	Endurance at 70 °C	Sub-clause 4.25.1	
		Ambient temperature: 70 °C ± 2 °C	
		Duration: 1000 h The voltage shall be applied in cycles of 1.5 h	
		on and 0.5 h.	
		The applied voltage shall be the rated voltage	
		or the limiting element voltage whichever is	
		the smaller.	
		Examination at 48 h, 500 h and	
		1000 h:	NI - 2-2-1- de cens
		Visual examination	No visible damage
		Resistance	$\Delta R \le \pm (1\% + 0.05\Omega)$

Drawing No: RNC-K-HTS-0001 /10

Title: FIXED THIN FILM CHIP RESISTORS; RECTANGULAR TYPE

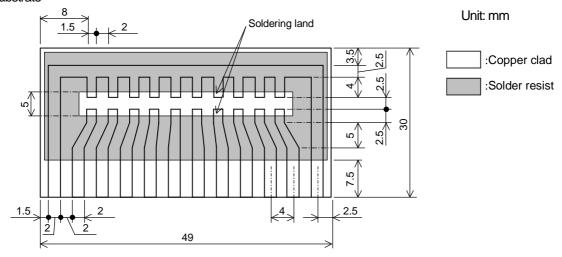
RNC06, 20, 32 Page: 7/12

#### Table-4(4)

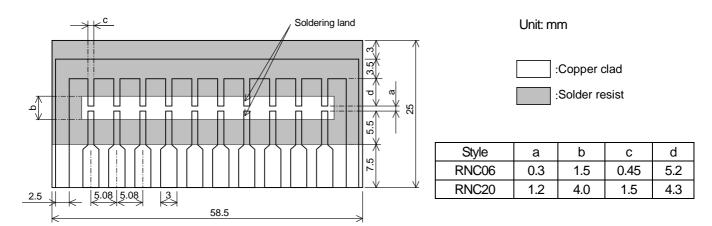
		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	
No	Test items	Condition of test (JIS C 5201–1)	Performance requirements
11	Mounting	Sub-clause 4.31	
		Substrate material: Epoxide woven glass	
		Test substrate: Figure–3	
	Variation of resistance with	Sub-clause 4.8	As in Table–1
	temperature	+20 °C / +125°C	
12	Mounting	Sub-clause 4.31	
		Substrate material: Epoxide woven glass	
		Test substrate: Figure–3	
	Damp heat, steady state	Sub-clause 4.24	
		Ambient temperature: 40 °C ± 2 °C	
		Relative humidity: $93^{+2}_{-3}$ %	
		a) 1st group: without voltage applied.	
		b) 2nd group: The d.c.voltage shall be applied	
		continuously.	
		The voltage shall be accordance with	
		Sub-clause 4.24.2.1 b). without polarizing	
		voltage [4.24.2.1, c)]	No visible damage
		Visual examination	Legible marking
			$\Delta$ R ≤ ± (1%+0.05Ω)
		Resistance	,
13	Dimensions (detail)	Sub-clause 4.4.3	As in Table–3
	Mounting	0 1 1 404	
	Mounting	Sub-clause 4.31	
		Substrate material: Epoxide	
		woven glass	
	Endurance at upper	Test substrate: Figure–3	
	category temperature	Sub-clause 4.25.3	
		Ambient temperature: 155 °C ± 2 °C Duration: 1000 h	
		Examination at 48 h, 500 h and 1000 h:	
		Visual examination	No visible damage
		Resistance	$\Delta R \le \pm (1\% + 0.05\Omega)$
		1 ในปิเป็น เป็น	

RNC06, 20, 32 Page: 8/12

#### 8. Test substrate



#### **RNC32 TEST SUBSTRATE**



RNC06, 20 TEST SUBSTRATE

Figure-3

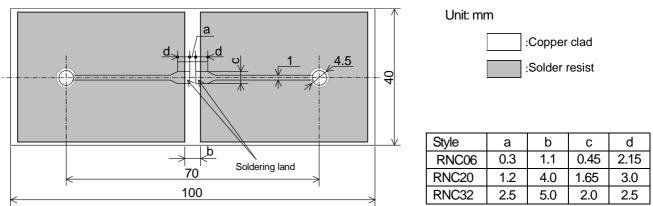
Remark 1). Material: Epoxide woven glass

Thickness: 1.6mm Thickness of copper clad: 0.035mm

2). In the case of connection by connector, the connecting terminals are gold plated. However, the plating is not necessary when the connection is made by soldering.

RNC06, 20, 32 Page: 9/12

Drawing No:



RNC BOUND STRENGTH OF THE END FACE PLATING TEST TEST SUBSTRATE

Figure-4

#### Remark 1). Material: Epoxide woven glass

Thickness: 1.6mm Thickness of copper clad: 0.035mm

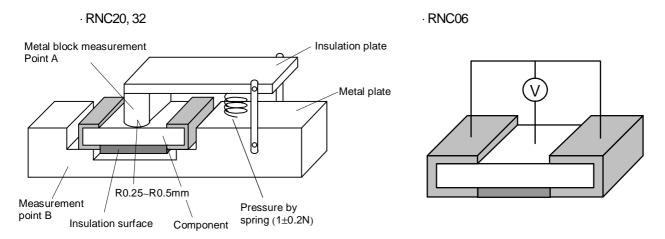


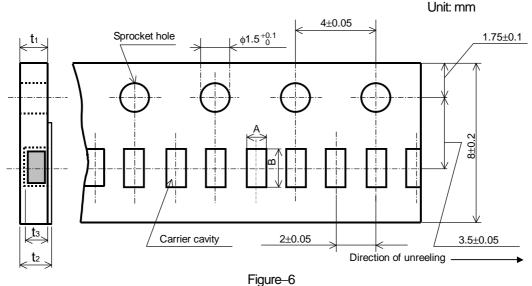
Figure-5

RNC06, 20, 32 Page: 10/12

#### 9. Taping

- 9.1 Applicable documents JIS C 0806-3: 2014, EIAJ ET-7200C: 2010
- 9.2 Taping dimensions
- 9.2.1 Press pocket taping (Paper taping, 8mm width, 2mm pitches)

Taping dimensions shall be in accordance with Figure-6 and Table-5.



 Tigule=0

 Table=5
 Unit: mm

 Style
 A
 B
 t<sub>1</sub>
 t<sub>2</sub>
 t<sub>3</sub>

 RNC06
 0.37±0.05
 0.67±0.05
 0.42±0.03
 0.45±0.05
 0.27±0.02

#### 9.2.2 Paper taping (8mm width, 4mm pitches)

Taping dimensions shall be in accordance with Figure-7 and Table-6.

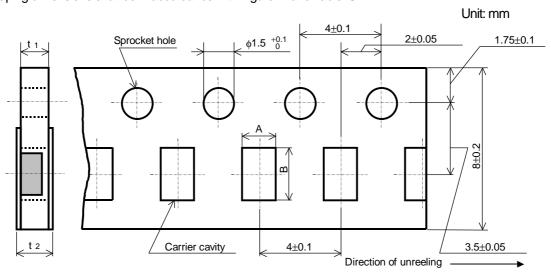


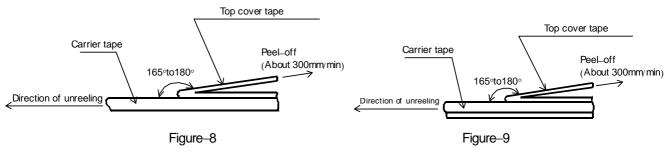
Figure-7
Table-6
Unit: mm

Style A B t<sub>1</sub> t<sub>2</sub>

RNC20 1.65 ± 0.15 2.5 ± 0.2
RNC32 2.00 ± 0.15 3.6 ± 0.2
Unit: mm
0.8 ± 0.1 1.0max.

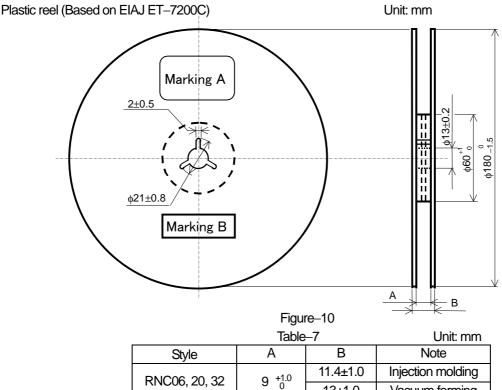
11/12 RNC06, 20, 32 Page:

- 1). The cover tapes shall not cover the sprocket holes.
- 2). Tapes in adjacent layers shall not stick together in the packing.
- 3). Components shall not stick to the carrier tape or to the cover tape.
- 4). Pitch tolerance over any 10 pitches ±0.2mm.
- 5). The peel strength of the top cover tape shall be with in 0.1N to 0.5N on the test method as shown in the following RNC06: Figure-8, RNC20, 32: Figure-9.
- 6). When the tape is bent with the minimum radius for 25 mm, the tape shall not be damaged and the components shall maintain their position and orientation in the tape.
- 7). In no case shall there be two or more consecutive components missing. The maximum number of missing components shall be one or 0.1%, whichever is greater.
- 8). The resistors shall be faced to upward at the over coating side in the carrier cavity.



#### 9.3 Reel dimension

Reel dimensions shall be in accordance with the following Figure-10 and Table-7.



Note: Marking label shall be marked on a place of Marking A or two place of marking A and B.

13±1.0

Vacuum forming

KAMAYA OHM

Drawing No: RNC-K-HTS-0001 /10

Title: FIXED THIN FILM CHIP RESISTORS; RECTANGULAR TYPE

RNC06, 20, 32 Page: 12/12

#### 9.4 Leader and trailer tape.

(Example)

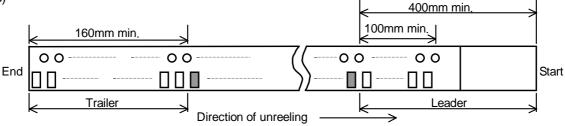


Figure-11

#### 10. Marking on package

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

#### 10.1 Marking A

(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 10.2 Marking B (KAMAYA Control label)

RNC06, 20, 32

### 製品仕様書類 制定、改訂 履歴書

製品仕様	書番号 RNC-	-K-HTS-0001	版数 第10版 頁 1/2	
版数	制定 改定日	頁	制定・改訂の内容	
1	1997.5.30	全	前製品仕様書 RNC-K-RD2-0001を廃止し、本製品仕様書を 新規制定する。	
2	1998.8. 8	1	1.2関連規格 JIS C 5222-1989→JIS C 5222-1995に変更	
			2.形名 RNC 32 RNC 32	
			種類 定格電力 → 種類 サイズ	
			形状に変更	
	1,2 2 3 4		2.形名、3.定格 抵抗温度特性 → 抵抗温度係数 に誤記訂正	
			4.包装形態 包装状態 → 包装形態に誤記訂正	
			5.2 製品重量(参考値)を追加	
			7.3 3短時間過負荷 規格値「著しい外観の異常がないこ と」を追加	
		5		
	6		規格値「機械的損傷のないこと」を追加 試験条件:(3)保持時間:10±1秒間を追加	
			7はんだ耐熱性 規格値「はんだクワレのないこと」→ 「著しい外観の異常がないこと」に変更	
			7.5 9温度サイクル、10耐久性(耐湿負荷)、11耐久性(定格 負荷) 規格値「著しい外観の異常がないこと」を追加	
			9.1関連規格 JIS C 0806-1990→JIS C 0806-1995に変更	
		11	10.包装に関する表示 「定格電力」を削除	
		<u></u> 全	寸法等数値の表現方法統一	
3	2000.9. 4	全	新JIS規格の制定に伴い全ページ改訂	
4	2002.9.29	5	7 性能 No.7 はんだ耐熱性	
	9			
			9.1 関連規格 EIAJ ET-7200:1997 → EIAJ ET-7200AIこ変更。	
			9.3 テーピング用リール	
			・EIAJ ET-7200 → EIAJ ET-7200A/こ変更。	
			-9 <sup>+03</sup> → 9 <sup>+10</sup> (mm) 以上変更。	
5	2007.10.1		1.2 関連規格 EIAJ RC-2133A-1998→EIAJ RC-2133B-2002 No.11 温度による抵抗値変化 試験条件-55°C/+20°Cを削除	
		9	9.1 関連規格 EIAJ ET-7200A:1999→EIAJ ET-7200B:2003 に変更。	
		10	9.3 テーピング用リール	
			EIAJ ET-7200A→EIAJ ET-7200B に変更	
			13±1.0mm 幅真空成形リール追加	
		11	10 包装に関する表示 2) 表示 B より形状を削除	
6	2008.10.1 1, 2		抵抗温度係数 C:±50 x 10°/°Cを削除	
		11	10 包装に関する表示 2)表示 B を社内管理ラベルとした。	
7	2012.10.5 全		全面見直し	
8 2015.6.26		1	3 定格 RNC06 定格抵抗値範囲 Tol: B 100~1k(Ω)→100~10kΩ	
			Tol: D $47\sim4.99k(\Omega)\rightarrow27\sim4.99(\Omega)$	
所長	マネーシ	<b>ジャー</b>	担当	
三宮	清理	·	戸田	

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AR03BTC0390 AR03BTC1102 AR03BTC1103 AR03BTC1201 AR03BTC2000 AR03BTC2201 AR03BTC2203 AR03BTC2490

AR03BTC3003 AR03BTC3302 AR03BTC3901 AR03BTC4220 AR03BTC4223N AR03BTC5602 AR03BTC5603 AR03BTC5900

AR03BTC7500 AR03BTC9100 AR03BTC9103 AR03BTC9760 AR05BTC0280 AR05BTC1000 AR05BTC1100 AR05BTC1201

AR05BTC1202 AR05BTC1300 AR05BTC14R3 AR05BTC1500 AR05BTC1523 AR05BTC1620 AR05BTC1622 AR05BTC1623

AR05BTC1760 AR05BTC1800 AR05BTC1823
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