No.: RVC-K-HTS-0001 /12

Date: 2019. 10. 11

Data sheet

Title: FIXED THICK FILM CHIP RESISTORS; RECTANGULAR

TYPE AND HIGH VOLTAGE

Style: RVC16,20,32,50,63

AEC-Q200 qualified

RoHS COMPLIANCE ITEM Halogen and Antimony Free

Note: •Stock conditions

Temperature: +5°C ~ +35°C Relative humidity: 25% ~ 75%

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

Solderability shall be satisfied.

 Product specification contained in this data sheet 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

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Title: FIXED THICK FILM CHIP RESISTORS; RECTANGULAR TYPE AND HIGH VOLTAGE

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1. Scope

1.1 This data sheet covers the detail requirements for fixed thick film chip resistors; rectangular type, style of RVC16, 20, 32, 50, 63.

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-2134C-2010

2. Classification

Type designation shall be the following form.

(Example)

RVC	32	_	475	F	TP
1	2	3	4	5	6
Sty	le				

1 Fixed thick film chip resistors; rectangular type and high voltage

— Style

2 Size

3 Temperature coefficient of resistance

K	±100×10 ⁻⁶ / °C	
-(Dash)	Standard	

4 Rated resistance Example

475	E24 Series, 3 digit,	Ex. 475> $4.7M\Omega$,
1000	E96 Series, 4 digit,	Ex. 1000>100Ω
		1022> 10.2kO

5 Tolerance on rated resistance

D	±0.5%
F	±1%
G	±2%
J	±5%
K	±10%

6 Packaging form

В	Bulk (loose package)	
TP	Paper taping	
TE	Embossed taping	

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3. Rating

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

Table-1

Style	Rated dissipation (W)		re coefficient of e (10 ⁻⁶ / °C)	Rated resistance range(Ω)	Preferred number series for resistors	Tolerance on rated resistance
		К	±100	470~10M	E24, 96	D(±0.5%), F(±1%), G(±2%)
RVC16	0.1	K	±100	470~1000	E24	J(±5%), K(±10%)
10010	0.1	Standard	±200	47~464	E24, 96	D(±0.5%), F(±1%), G(±2%)
		Stariuaru	1200	47~404	E24	J(±5%), K(±10%)
		K	±100	100~10M	E24, 96	D(±0.5%), F(±1%), G(±2%)
RVC20	0.25	K	_ 100	100~51M	E24	J(±5%), K(±10%)
10020	0.23	Standard	±200	47~97.6	E24, 96	D(±0.5%), F(±1%), G(±2%)
		Stariuaru	1200	47~97.0	E24	J(±5%), K(±10%)
		K	±100	100~10M	E24, 96	D(±0.5%), F(±1%), G(±2%)
RVC32	0.25	, <u>, , , , , , , , , , , , , , , , , , </u>	±100	100~51M	E24	J(±5%), K(±10%)
1110002		Standard	±200	47~97.6	E24, 96	D(±0.5%), F(±1%), G(±2%)
					E24	J(±5%), K(±10%)
	0.5	0.5 Standard	±100	470~10M	E24, 96	D(±0.5%)
				470~20M		F(±1%), G(±2%)
RVC50				470~51M	E24	J(±5%), K(±10%)
			dard ±200	47~464	E24, 96	D(±0.5%), F(±1%), G(±2%)
				1200 41~404	47~404	E24
				560~10M	F24 06	D(±0.5%)
		K	±100	560~20M	E24, 96	F(±1%), G(±2%)
				560~51M	E24	J(±5%), K(±10%)
RVC63	1.0		1000	400 E40	E24, 96	D(±0.5%), F(±1%), G(±2%)
		Standard —	±200	100~549	E24	J(±5%), K(±10%)
			+500~-200	47~97.6	E24, 96	D(±0.5%), F(±1%), G(±2%)
					E24	J(±5%), K(±10%)

Style	Limiting element voltage(V)	Isolation voltage (V)	Category temperature range (°C)
RVC16	350	100	
RVC20	400		
RVC32	800	500	<i>–</i> 55∼+155
RVC50	2000 (DC)	300	
RVC63	3000 (DC)		

3.2 Climatic category

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

3.3 Stability class

5% Limits for change of resistance:

> -for long-term tests $\pm (5\% + 0.1\Omega)$ -for short-term tests $\pm (1\% + 0.05\Omega)$

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3.4 Derating

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

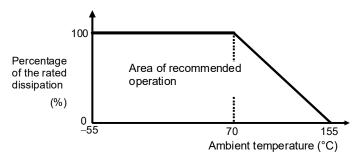


Figure-1 Derating curve

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 (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		
В	Bulk (loose package		1,000 pcs.	RVC16, 20, 32, 50, 63		
TP	Paper taping	8mm width, 4mm pitches	5,000 pcs.	RVC16, 20, 32		
TE	Embossed taping	12mm width, 4mm pitches	4,000 pcs.	RVC50, 63		

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5. Dimensions

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

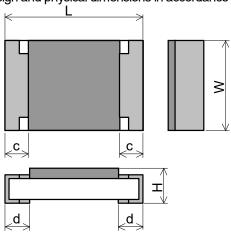


Figure-2

	Iable-3				Unit : mm
Style	L	W	Н	С	d
RVC16	1.6 ± 0.1	0.8 +0.15	0.45 ± 0.10	0.3 ± 0.1	0.3 ± 0.1
RVC20	2.0 ± 0.1	1.25 ± 0.10	0.55 ± 0.10	0.4 ± 0.2	0.4 ± 0.2
RVC32	3.1 ± 0.1	1.6 ± 0.15	0.55 ± 0.10	0.5 ± 0.25	0.5 ± 0.25
RVC50	5.0 ± 0.15	2.5 ± 0.15	0.55 ± 0.15	0.6 ± 0.2	0.6 ± 0.2
RVC63	6.3 ± 0.15	3.2 ± 0.15		0.0 ± 0.2	0.0 ± 0.2

5.2 Net weight (Reference)

<u> </u>				
Style	Net weight(mg)			
RVC16	2			
RVC20	5			
RVC32	9			
RVC50	25			
RVC63	40			

6. Marking

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

The Rated resistance of RVC16 should not be marked in 4 digits.

(Example) "123"
$$\to$$
 12 ×10 3 [Ω] \to 12 [k Ω] "5623" \to 562 ×10 3 [Ω] \to 562 [k Ω] "51R1" \to 51.1 [Ω]

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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 (JIS C 5201–1)	Performance requirements
1	Visual examination	Sub-clause 4.4.1	As in 4.4.1
'	Visual examination		The marking shall be legible, as
		Checked by visual examination.	checked by visual examination.
	Disconsion	0.1 1	•
2	Dimension	Sub-clause 4.4.2	As specified in Table-3 of this
	Desistance		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	Cub aloues 4.7	No breakdown or flash over
3	Voltage proof	Sub-clause 4.7	No preakdown or liash 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 s ± 5 s	
		Insulation resistance	R≥1GΩ
		Test voltage: Insulation voltage	1121032
		Duration: 1 min.	
4	Solderability	Sub-clause 4.17	As in 4.17.4.5
ļ ·	Coldorability	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	g.
		Immersion time: 2 s ± 0.5 s	
5	Mounting	Sub-clause 4.31	
	3	Substrate material: Epoxide woven glass	
		Test substrate: Figure–3	
		Sub-clause 4.13	
	Overload	The applied voltage shall be 2.5 times the rated	
	(in the mounted state)	voltage(DC) or following the max. overload	
		voltage(DC), whichever is the less severe.	
		RVC16: 500V	
		RVC20: 800V	
		RVC32: 1000V	
		RVC50: 3000V	
		RVC63: 4000V	
		Duration: 2 s	No. 228 Louis and
		Visual examination	No visible damage
	Cohront registeres of 41-	Resistance	$\Delta R \leq \pm (1\% + 0.05\Omega)$
	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	
		Without recovery	

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Table-4(2)

No	Test items	Condition of test (JIS C 5201–1)	Performance requirements
6	Mounting	Sub-clause 4.31	
		Substrate material: Epoxide woven glass	
		Test substrate: Figure-4	
	Bound strength of the end	Sub-clause 4.33	
	face plating	Bent value: 3 mm (3216 size max.)	
		1 mm (5025 size min.)	1D (40/ . 0.050)
	Final measurements	Resistance	$\Delta R \le \pm (1\% + 0.05\Omega)$
	Final measurements	Sub-clause 4.33.6	No visible damage
		Visual examination	
7	Resistance to soldering heat	Sub-clause 4.18	
		Solder temperature: 260 °C ± 5 °C	
		Immersion time: 10 s ± 0.5 s	As in 4.18.3.4
		Visual examination	
		Resistance	No sign of damage such as cracks.
	Component solvent	Sub-clause 4.29	$\Delta R \le \pm (1\% + 0.05\Omega)$
	resistance		
	TOSISIEI IOC	Solvent: 2–propanol Solvent temperature: 23 °C ± 5 °C	
		Method 2	
		Recovery: 48 h	
		Visual examination	No visible damage
		Resistance	$\Delta R \le \pm (1\% + 0.05\Omega)$
8	Mounting	Sub-clause 4.31	,
		Substrate material: Epoxide woven glass	
		Test substrate: Figure–3	
	Adhesion	Sub-clause 4.32	
		Force: 5 N	
		Duration: 10 s ± 1 s	
		Visual examination	No visible damage
	Rapid change temperature	Sub-clause 4.19	
		Lower category temperature: –55 °C	
		Upper category temperature: +125 °C	
		Duration of exposure at each temperature: 30	
		min.	
		Number of cycles: 5 cycles.	No visible damage
		Visual examination	$\Delta R \le \pm (1\% + 0.05\Omega)$
		Resistance	△ · · · · · · · · · · · · · · · · · · ·

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FIXED THICK FILM CHIP RESISTORS; RECTANGULAR TYPE AND HIGH VOLTAGE

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Table-4(3)

No	Test items	Condition of test (JIS C 5201–1)	Performance requirements
9 Climatic sequence		Sub-clause 4.23	
	-Dry heat	Sub-clause 4.23.2	
'		Test temperature: +155 °C	
		Duration: 16 h	
	–Damp heat, cycle	Sub-clause 4.23.3	
	(12+12hour cycle)	Test method: 2	
	First cycle	Test temperature: 55 °C	
		[Severity(2)]	
	-Cold	Sub-clause 4.23.4	
		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)]	
		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.			No visible damage
		Visual examination	$\Delta R \le \pm (5\% + 0.1\Omega)$
		Resistance	∆(\≤± (5/010.122)
10	Mounting	Sub-clause 4.31	
		Substrate material: Epoxide woven glass	
		(RVC63 may use Alumina substrate.)	
	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.		
1000 h: Visual examination		Examination at 48 h , 500 h and	
			No visible damage
		Resistance	$\Delta R \le \pm (5\% + 0.1\Omega)$
		i vegigiai ide	(5/0:0:122)

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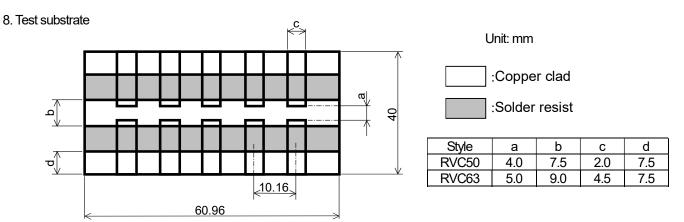
FIXED THICK FILM CHIP RESISTORS; RECTANGULAR TYPE AND HIGH VOLTAGE

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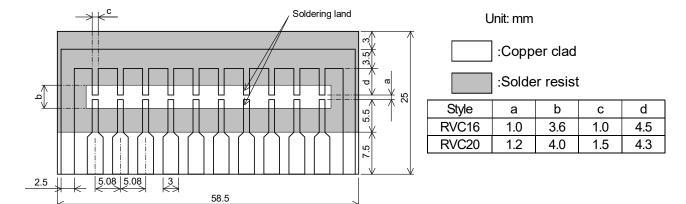
Table-4(4)

No	Test items	Condition of test (JIS C 5201–1)	Performance requirements
11	Mounting Variation of resistance with temperature	Sub-clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure–3 Sub-clause 4.8 –55 °C / +20 °C +20 °C / +155°C	As in Table–1
12	Mounting Damp heat, steady state	Sub-clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure–3 Sub-clause 4.24 Ambient temperature: 40 °C ± 2 °C Relative humidity: 93 ½ % 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)] Visual examination Resistance	No visible damage Legible marking $\Delta R \leq \pm (5\% + 0.1\Omega)$
13	Dimensions (detail) Mounting Endurance at upper category temperature	Sub-clause 4.4.3 Sub-clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure–3 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 Resistance	As in Table–3 No visible damage $\Delta R \leq \pm (5\% + 0.1\Omega)$

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RVC50,63 TEST SUBSTRATE



RVC16,20 TEST SUBSTRATE Soldering land Unit: mm :Copper clad :Solder resist

RVC32 TEST SUBSTRATE

2.5

Figure-3

Remark 1). Material: Epoxide woven glass

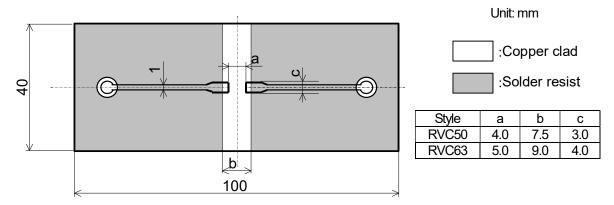
1.5

Thickness: 1.6mm Thickness of copper clad: 0.035mm

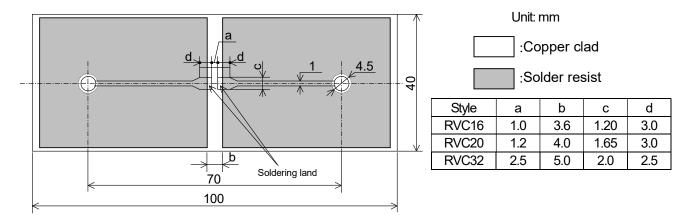
49

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.

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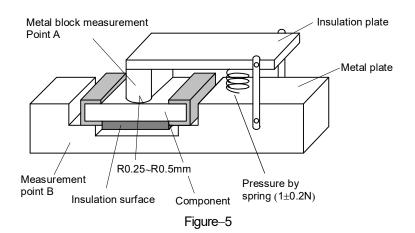
RVC50,63 BOUND STRENGTH OF THE END FACE PLATING TEST SUBSTRATE



Remark 1). Material: Epoxide woven glass

Thickness: 1.6mm Thickness of copper clad: 0.035mm

RVC16,20,32 BOUND STRENGTH OF THE END FACE PLATING TEST SUBSTRATE Figure-4



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9. Taping

- 9.1 Applicable documents JIS C 0806-3: 2014, EIAJ ET-7200C: 2010
- 9.2 Taping dimensions
- 9.2.1 Paper taping (8mm width, 4mm pitches)

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

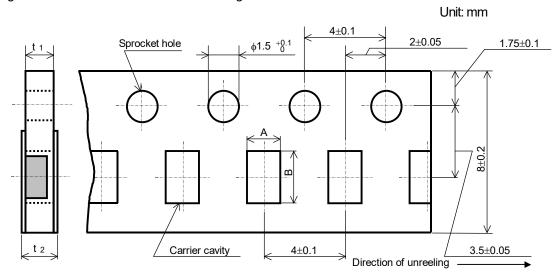


Figure-6

Table–5				Unit: mm
Style	Α	В	t 1	t 2
RVC16	1.15±0.15	1.9±0.2	0.6±0.1	0.8max.
RVC20	1.65±0.15	2.5±0.2 0.8±0.1		1.0max.
RVC32	2.00±0.15	3.6±0.2	0.0±0.1	1.0IIIax.

9.2.2 Embossed taping dimensions shall be in accordance with Figure-7 and Table-6.

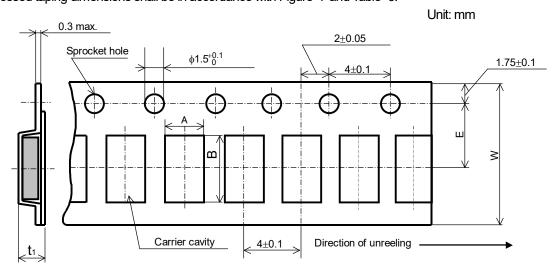


Figure-7

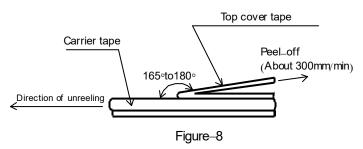
Table–6			Unit: mm		
Style	Α	В	W	E	t 1
RVC50	3.1±0.2	5.5±0.2	120102	5 5 10 OF	1 1 1 0 15
RVC63	3.6±0.2	6.9±0.2	12.0±0.3	5.5±0.05	1.1±0.15

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- 1). The cover tapes shall not cover the sprocket holes.
- 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 RVC16,20,32: Figure-8, RVC50,63: Figure-9.
- 6). When the tape is bent with the minimum radius for RVC16,20,32: 25 mm, or RVC50,63: 30 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.



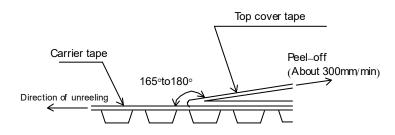


Figure-9

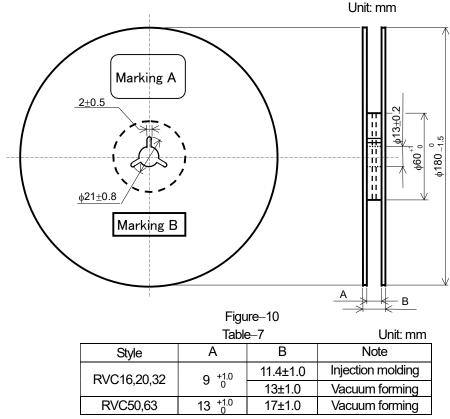
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9.3 Reel dimension

Reel dimensions shall be in accordance with the following Figure–10 and Table–7. Plastic reel (Based on EIAJ ET–7200C)



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

9.4 Leader and trailer tape.

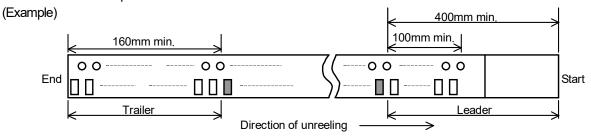


Figure-11

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)