No.:	RVC-K-HTS-0001	
Date:	2023. 1. 11	

Data sheet

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

Style: RVC16,20,32,50,63

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 shipment 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		
	RVC16,20,32,50,63	Page:	1/13

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

(Example)

Type designation shall be the following form.

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

3 Temperature coefficient of resistance

K	±100×10 ⁻⁶ / °C
-(Dash)	Standard

4 Rated resistance Example

475	E24 Series, 3 digit,	Ex. 475> 4.7MΩ,
1000	E96 Series, 4 digit,	Ex. 1000>100Ω
		1022> 10.2kΩ

5 Tolerance on rated resistance

D	±0.5%
F	±1%
G	<u>+2%</u>
J	±5%
К	±10%

6 Packaging form

0		
В	Bulk (loose package)	
TP	Paper taping	
TE	Embossed taping	

FIXED THICK FILM CHIP RESISTORS; RECTANGULAR TYPE AND HIGH VOLTAGE Title: RVC16,20,32,50,63

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3. Rating

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

	Table-1					
Style	Rated	Temperature coefficient of resistance (10 ⁻⁶ /°C)		Rated resistance	Preferred number	Tolerance on rated resistance
	dissipation (W)	resistanc	e (10 ⁻ ° / °C)	range(Ω)	series for resistors	
		К	±100	470~10M	E24, 96	D(±0.5%), F(±1%)
RVC16	0.1			47.404	E24	G(±2%), J(±5%), K(±10%)
		Standard	±200	47~464	E24, 96	D(±0.5%), F(±1%)
				47~430	E24	G(±2%), J(±5%), K(±10%)
				100~10M	E24, 96	D(±0.5%), F(±1%)
D 1 (0.00	0.05	К	±100	100~10M	E24	G(±2%)
RVC20	0.25			100~51M		J(±5%), K(±10%)
		Standard	<u>+200</u>	47~97.6	E24, 96	D(±0.5%), F(±1%)
		ola ida id		47~91	E24	G(±2%), J(±5%), K(±10%)
				100~10M	E24, 96	D(±0.5%), F(±1%)
		K Standard	±100	100~10M	E24	G(±2%)
RVC32	0.25			100~51M	E24	J(±5%), K(±10%)
			±200	±200 47~97.6 -	E24, 96	D(±0.5%), F(±1%)
					E24	G(±2%), J(±5%), K(±10%)
		к		470~10M	E24, 96	D(±0.5%)
			±100	470~20M		F(±1%)
RVC50	0.5			470~20M		G(±2%)
	0.5			470~51M	E24	J(±5%), K(±10%)
		Oteredevel	1000	47~464	E24, 96	D(±0.5%), F(±1%)
		Standard	±200	47~430	E24	G(±2%), J(±5%), K(±10%)
				560~10M	F04.00	D(±0.5%)
				500, 00M	E24, 96	F(±1%)
		K	±100	560~20M		G(±2%)
RVC63	1.0			560~51M	E24	J(±5%), K(±10%)
110000	1.0		1000	100~549	E24, 96	D(±0.5%), F(±1%)
		Chandard	±200	100~470	E24	G(±2%), J(±5%), K(±10%)
		Standard	. 500 000	47~97.6	E24, 96	D(±0.5%), F(±1%)
			+500~-200	47~91	E24	G(±2%), J(±5%), K(±10%)

Style	Limiting element voltage(V)	Insulation voltage (V)	Category temperature range (°C)
RVC16	350	100	
RVC20	400		
RVC32	800	500	-55~+155
RVC50	2000 (DC)	500	
RVC63	3000 (DC)		

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

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 FIXED THICK FILM CHIP RESISTORS; RECTANGULAR TYPE AND HIGH VOLTAGE

 RVC16,20,32,50,63
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3.3 Stability class

2%

Limits for change of resistance:-for long-term tests $\pm(2\%+0.1\Omega)$ -for short-term tests $\pm(0.5\%+0.05\Omega)$

3.4 Derating

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

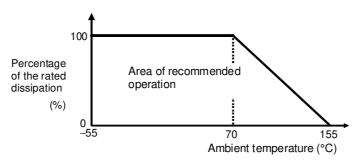


Figure-1 Derating curve

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.

	Idule-2				
Symbol	mbol 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	

Toble 0

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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.

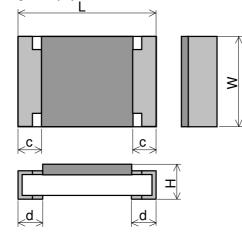


Figure-2

Table-3					Unit : mm
Style	L	W	Н	С	d
RVC16	1.6±0.1	0.8 ^{+0.15} -0.05	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	0.55 ± 0.15	0.6 ± 0.2	0.6±0.2

5.2 Net weight (Reference)

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.

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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 Checked by visual examination.	As in 4.4.1 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 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 Test voltage: Insulation voltage Duration: 1 min.	No breakdown or flash over $R \ge 1 \ G \ \Omega$
4	Solderability	Sub-clause 4.17 Without ageing Flux: The resistors shall be immersed in a non-activated soldering flux for 2s. Bath temperature: $235 \text{ °C} \pm 5 \text{ °C}$ Immersion time: $2 \text{ s} \pm 0.5 \text{ s}$	As in 4.17.4.5 The terminations shall be covered with a smooth and bright solder coating.
5	Mounting Overload (in the mounted state)	Sub-clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure-3 Sub-clause 4.13 The applied voltage shall be 2.5 times the rated voltage(DC) or following the max. overload voltage(DC), whichever is the less severe. RVC16: 500V RVC20: 800V RVC20: 800V RVC32: 1000V RVC50: 3000V RVC63: 4000V Duration: 2 s	
	Solvent resistance of the marking	Visual examination Resistance Sub-clause 4.30 Solvent: 2-propanol Solvent temperature: 23 °C ± 5 °C Method 1 Rubbing material: cotton wool Without recovery	No visible damage ΔR ≤ ± (1%+0.05Ω) Legible marking

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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.)	
	Final manage warmanta	Resistance	$\Delta \mathbf{R} \leq \pm (0.5\% + 0.05\Omega)$
	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 \pm 5 °C	
		Immersion time: $10 \text{ s} \pm 0.5 \text{ s}$	
		Visual examination	As in 4.18.3.4
		–	No sign of damage such as cracks.
		Resistance	ΔR≤±(0.5%+0.05Ω)
	Component solvent	Sub-clause 4.29	
	resistance	Solvent: 2-propanol	
		Solvent temperature: 23 °C ± 5 °C	
		Method 2	
		Recovery: 48 h	No visible domage
		Visual examination	No visible damage $\Delta R \leq \pm (0.5\% + 0.05\Omega)$
0	Maximatica	Resistance	$\Delta R \ge \pm (0.5\% + 0.0522)$
8	Mounting	Sub-clause 4.31	
		Substrate material: Epoxide woven glass	
	Adhesion	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	No voloio darnago
		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	ΔR≤±(0.5%+0.05Ω)

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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	$\Delta R \le \pm (2\% + 0.1\Omega)$			
		Resistance	$\Delta 11 \le \pm (2.76 \pm 0.152)$			
10	Mounting	Sub-clause 4.31				
		Substrate material: Epoxide woven glass				
		(RVC63 may use Alumina substrate.)				
		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:	No visible damage			
		Visual examination	5			
		Resistance	$\Delta R \leq \pm (2\% + 0.1\Omega)$			

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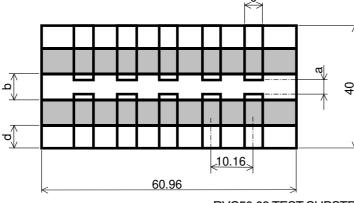
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	Table-4(4)						
No	Test items	Condition of test (JIS C 5201–1)	Performance requirements				
11	Mounting Variation of resistance with temperature	Sub-clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure–3 Sub-clause 4.8 –55 °C / +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 +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)] Visual examination Resistance 	No visible damage Legible marking $\Delta R \leq \pm (2\%+0.1\Omega)$				
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 $\Delta R \le \pm (2\%+0.1\Omega)$				

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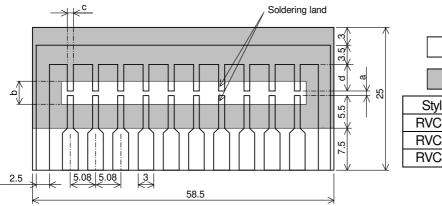
8. Test substrate



Unit: mm :Copper clad :Solder resist

а	D	С	d
4.0	7.5	2.0	7.5
5.0	9.0	4.5	7.5
	4.0 5.0	4.07.55.09.0	

RVC50,63 TEST SUBSTRATE



:Copper clad							
:Solder resist							
Style	а	b	С	d			
RVC16	1.0	3.6	1.0	4.5			
RVC20	1.2	4.0	1.5	4.3			
RVC32	2.1	3.9	1.7	3.4			

Unit: mm

RVC16,20, 32 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.

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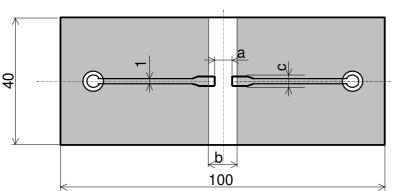
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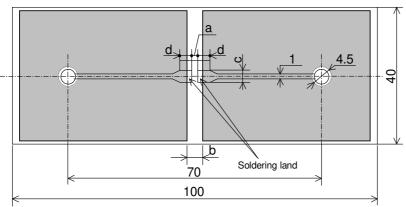
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Unit: mm :Copper clad :Solder resist Style b а RVC50 4.0 7.5 3.0 RVC63 5.0 9.0 4.0

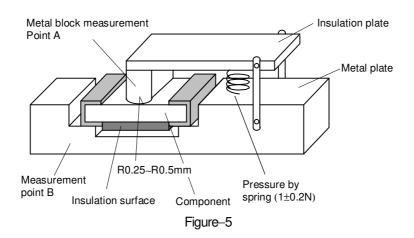
RVC50,63 BOUND STRENGTH OF THE END FACE PLATING TEST SUBSTRATE



	Unit: mm						
	:Copper clad						
	:Solder resist						
	Style a b c d						
RVC16 1.0 3.6 1.20 3					3.0		
	3.0						
	RVC32	2.5	5.0	2.0	2.5		

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.

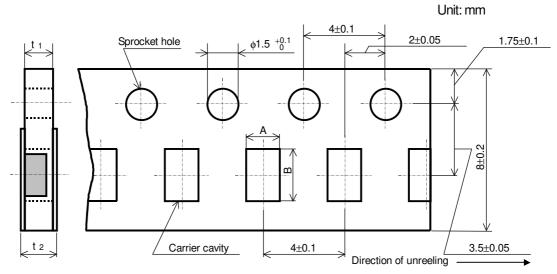


Figure-6

. . ..

		Unit: mm			
	Style	А	В	t 1	t 2
ſ	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	

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

Unit: mm 0.3 max. 2 ± 0.05 4 ± 0.1 $1.75\pm 0.$



Table–6					Unit: mm
Style	Α	В	W	E	t 1
RVC50	3.1±0.2	5.5±0.2	120402		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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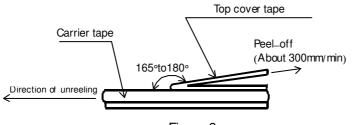
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- 1). The cover tapes shall not cover the sprocket holes.
- 2). Tapes in adjacent layers shall not stick together in the packing.
- 3). Components shall not stick to the carrier tape or to the cover tape.
- 4). Pitch tolerance over any 10 pitches ±0.2mm.
- 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 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.





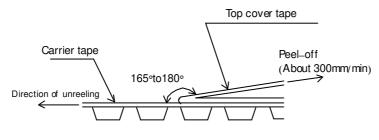


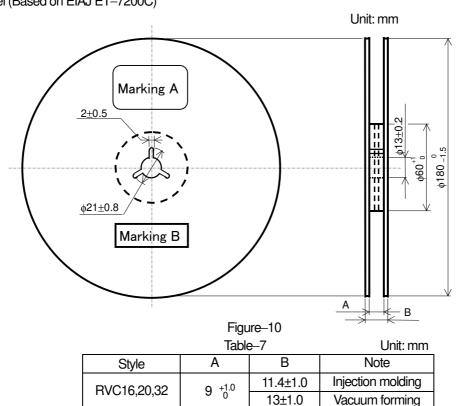
Figure-9

Title: FIXED THICK FILM CHIP RESISTORS; RECTANGULAR TYPE AND HIGH VOLTAGE RVC16,20,32,50,63 Page:

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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)



+1.0 Note: Marking label shall be marked on a place of Marking A or two place of marking A and B.

17±1.0

Vacuum forming

13

9.4 Leader and trailer tape.

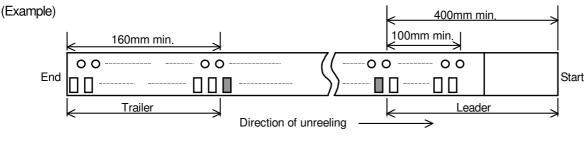


Figure-11

10. Marking on package

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

RVC50.63

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)

Product specification contained in this data sheet are subject to change at any time without notice.