No.: RGC-K-HTS-0001 /13

Date: 2017. 4. 21

# Data sheet

Title: FIXED THICK FILM CHIP RESISTORS; RECTANGULAR TYPE &

**PRECISION** 

Style: RGC1/32,1/20,1/16S,1/16,1/10,1/8

AEC-Q200 qualified (Without RGC1/32)

RoHS COMPLIANCE ITEM
Halogen and Antimony Free

Note: • Stock conditions

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

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 KAMAYA OHM

No: RGC-K-HTS-0001

/13

FIXED THICK FILM CHIP RESISTORS; RECTANGULAR TYPE & PRECISION

RGC1/32,1/20,1/16S,1/16,1/10,1/8 Page: 1/13

# 1. Scope

1.1 This data sheet covers the detail requirements for fixed thick film chip resistors; rectangular type & precision, style of RGC1/32,1/20,1/16S,1/16,1/10,1/8.

## 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)

RGC	1/8	С	123	D	TP
1	2	3	4	5	6
Sty	le				

1 Fixed thick film chip resistors; rectangular type & precision

Style

2 Rated dissipation and / or dimension

3 Temperature coefficient of resistance

K	±100×10 <sup>6</sup> / °C
С	±50×10 <sup>6</sup> / °C

# 4 Rated resistance

123	E24 Series, 3 digit,	Ex. 123> 12kΩ,
1000	E96 Series, 4 digit,	Ex. 1000>100Ω
		1022> 10.2kΩ

#### 5 Tolerance on rated resistance

В	±0.1%
D	±0.5%
F	±1%

# 6 Packaging form

<u> </u>	
В	Bulk (loose package)
PA	Press pocket taping
TH	Donortoning
TP	Paper taping

FIXED THICK FILM CHIP RESISTORS; RECTANGULAR TYPE & PRECISION

RGC1/32,1/20,1/16S,1/16,1/10,1/8 Page: 2/13

## 3. Rating

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

#### Table-1

Style	Rated		e coefficient of	Rated resistance	Preferred number	Tolerance on rated
Style	dissipation (W)	resistance	e ( 10⁴ / °C)	$range(\Omega)$	series for resistors	resistance
RGC1/32	0.03	С	± 50	100~100k	E24,96	D(±0.5%)
DCC1/20	0.05	С	± 50	1k~1M	E34.06	B(±0.1%),
RGC1/20	0.05	K	±100	51~976	E24,96	D(±0.5%)
		С	± 50	100~1M		B(±0.1%),
RGC1/16S	0.063	K	.400	1.02M~3.3M	E24,96	D(±0.5%)
		r.	±100	10~97.6		F(±1%)
		С	±50	100~1M		B(±0.1%),
DCC1/16	0.1			1.02M~3.3M	E24.06	D(±0.5%)
RGC1/16	0.1	K	±100	10~97.6	E24,96	F(±1%)
				3.3~9.76		D(±0.5%)F(±1%)
						B(±0.1%),
RGC1/10	0.125	С	± 50	10~3.3M	E24,96	D(±0.5%)
KGC1/10	0.125	C	± 50		E24,90	F(±1%)
				3.3~9.76		D(±0.5%)F(±1%)
						B(±0.1%),
RGC1/8	0.25	С	± 50	10~4.7M	E24,96	D(±0.5%)
NGC 1/0	0.25	C	± 30		L24,90	F(±1%)
				3.3~9.76		F(±1%)

Style	Limiting element voltage	Isolation voltage	Category temperature
	(V)	(V)	range(°C)
RGC1/32	15	50	-55~+125
RGC1/20	25	30	
RGC1/16S	EQ.		
RGC1/16	50	100	<i>–</i> 55∼+155
RGC1/10	150	100	
RGC1/8	200		

# 3.2 Climatic category

3.2.1 RGC1/32

55/125/56 Lower category temperature -55 °C

> +125 °C Upper category temperature

> Duration of the damp heat, steady state test 56days

3.2.2 RGC1/20,1/16S,1/16,1/10,1/8

55/155/56 -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  $\pm (1\% + 0.05\Omega)$

RGC1/32,1/20,1/16S,1/16,1/10,1/8 Page: 3/13

## 3.4 Derating

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

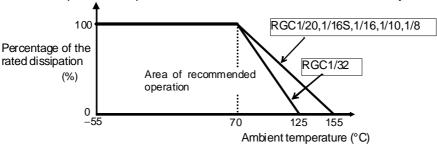


Figure-1 Derating curve

# 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 ( $\Omega$ )

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.	RGC1/32,1/20,1/16S,1/16,1/10,1/8
PA	Press pocket taping	8mm width, 2mm pitches	20,000 pcs.	RGC1/32
FA	(paper taping)	ornin widin, zmin piiches	15,000 pcs.	RGC1/20
TH	Paper taping	8mm width, 2mm pitches	10,000 pcs.	RGC1/16S
TP	Paper taping	8mm width, 4mm pitches	5,000 pcs.	RGC1/16, 1/10, 1/8

RGC1/32,1/20,1/16S,1/16,1/10,1/8 Page: 4/13

#### 5. Dimensions

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

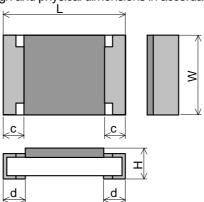


Figure-2

Table–3 Unit: mm

Style	L	W	Н	С	d
RGC1/32	0.4±0.02	0.2±0.02	0.13±0.02	0.08±0.03	0.1±0.03
RGC1/20	0.6±0.03	0.3±0.03	0.23±0.03	0.1±0.05	0.15±0.05
RGC1/16S	1.0±0.05	0.5±0.05	0.35±0.05	0.2±0.1	$0.25^{+0.05}_{-0.10}$
RGC1/16	1.6±0.1	0.8 +0.15 -0.05	0.45±0.10	0.25±0.10	0.3±0.1
RGC1/10	2.0±0.1	1.25±0.10	0.6±0.1	0.4±0.2	0.4±0.2
RGC1/8	3.1±0.1	1.6±0.15	0.6±0.1	0.5±0.25	0.5±0.25

# 5.2 Net weight (Reference)

Style	Net weight(mg)
RGC1/32	0.035
RGC1/20	0.16
RGC1/16S	0.6
RGC1/16	2
RGC1/10	5
RGC1/8	9

# 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 RGC1/16 should not be marked in 4 digits.

The Rated resistance of RGC1/32,1/20,1/16S should not be marked.

Marking example	Contents	Application
123	$12\times10^3 \ [\Omega] \rightarrow 12 \ [k\Omega]$	RGC1/16,1/10,1/8
3R3	3.3 [Ω]	Less than 10Ω of RGC1/16,1/10,1/8
5623	$562\times10^3 [\Omega] \rightarrow 562[k\Omega]$	RGC1/10,1/8
12R7	12.7 [Ω]	RGC1/10,1/8

**KAMAYA OHM** 

No: RGC-K-HTS-0001 /13

FIXED THICK FILM CHIP RESISTORS; RECTANGULAR TYPE & PRECISION

RGC1/32,1/20,1/16S,1/16,1/10,1/8 Page: 5/13

#### 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
'	VISUAI EXAITIII IAUOTI	Checked by visual examination.	The marking shall be legible, as
		Checked by visual examination.	checked by visual examination.
2	Dimension	Sub-clause 4.4.2	As specified in Table-3 of this
_		Cub diadoc 4.4.2	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 s ± 5 s	D: 400
		Insulation resistance	R≥1GΩ
		Test voltage: Insulation voltage	
4	Coldorability	Duration: 1 min.	As in 4.17.4.5
4	Solderability	Sub-clause 4.17	The terminations shall be covered
		Without ageing 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	oodii ig.
		Immersion time: 2 s ± 0.5 s	
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	
		Visual examination	
		Resistance	No visible damage
	Solvent resistance of the	Sub-clause 4.30	$\Delta R \le \pm (1\% + 0.05\Omega)$
	marking	Solvent: 2-propanol	Legible marking
	Harking	Solvent temperature: 23 °C ± 5 °C	
		Method 1	
		Rubbing material: cotton wool	
		Without recovery	

FIXED THICK FILM CHIP RESISTORS; RECTANGULAR TYPE & PRECISION

RGC1/32,1/20,1/16S,1/16,1/10,1/8 Page: 6/13

# Table-4(2)

	<b>-</b>		5 (
No	Test items	Condition of test (JIS C 5201–1) Performance requirement	
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	
		Resistance	$\Delta R \le \pm (1\% + 0.05\Omega)$
	Final measurements	Sub-clause 4.33.6	
		Visual examination	No visible damage
7	Resistance to soldering heat	Sub-clause 4.18	
	9	Solder temperature: 260 °C ± 5 °C	
		Immersion time: 10 s ± 0.5 s	
		Visual examination	As in 4.18.3.4
		Viodal Oxali ili ladoli	No sign of damage such as cracks.
		Resistance	$\Delta R \le \pm (1\% + 0.05\Omega)$
	Component solvent	Sub-clause 4.29	Zi( = 2 (17010.0022)
	resistance	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	ZI( = 2 (17010.0002)
U	Modifuing	Substrate material: Epoxide woven glass	
		Test substrate: Figure–3	
	Adhesion	Sub-clause 4.32	
	Adilesion		
		Force: 5 N(RGC1/32: 2N, RGC1/20: 3N)	
		Duration: 10 s ± 1 s	No visible damage
	Rapid change temperature	Visual examination	140 VISIBIC darriage
	rapid change temperature	Sub-clause 4.19	
		RGC1/32	
		Lower category temperature: -55 °C	
		Upper category temperature: +125 °C	
		RGC1/20,1/16S,1/16,1/10,1/8	
		Lower category temperature: -55 °C	
		Upper category temperature: +155 °C	
		Duration of exposure at each temperature: 30	
		min.	
		Number of cycles: 5 cycles.	No visible damage
		Visual examination	_
		Resistance	$\Delta R \le \pm (1\% + 0.05\Omega)$

FIXED THICK FILM CHIP RESISTORS; RECTANGULAR TYPE & PRECISION

RGC1/32,1/20,1/16S,1/16,1/10,1/8 Page: 7/13

# 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	
	,	RGC1/32	
		Test temperature: +125 °C	
		RGC1/20,1/16S,1/16,1/10,1/8:	
		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	
	3 ,	[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.	Nie Salie de como
		Visual examination	No visible damage
		Resistance	$\Delta R \le \pm (5\% + 0.1\Omega)$
10	Mounting	Sub-clause 4.31	
	_	Substrate material: Epoxide woven glass	
		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:		
			Nie vielle de se e se
		Visual examination	No visible damage
		Resistance	$\Delta R \le \pm (5\% + 0.1\Omega)$

**KAMAYA OHM** 

No: RGC-K-HTS-0001

/13

FIXED THICK FILM CHIP RESISTORS; RECTANGULAR TYPE & PRECISION

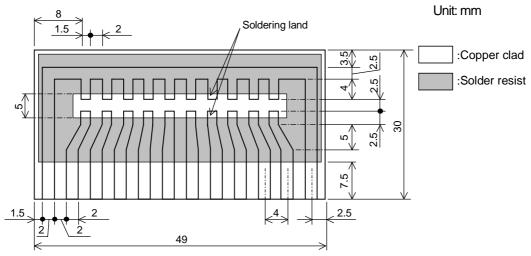
RGC1/32,1/20,1/16S,1/16,1/10,1/8 Page: 8/13

# Table-4(4)

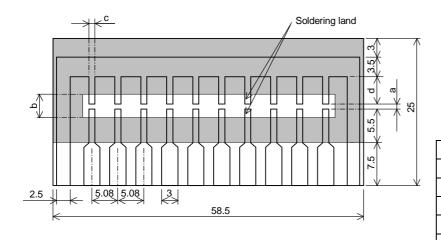
No	Test items	Condition of test (JIS C 5201–1)	Performance requirements	
11	Mounting  Variation of resistance with temperature	Sub-clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure-3 Sub-clause 4.8 RGC1/32: +20 °C / +125 °C RGC1/20,1/16S,1/16,1/10,1/8: +20 °C / +155 °C	As in 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+3/2 % 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 ΔR ≤ ± (5%+0.1Ω)	
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  RGC1/32:  Ambient temperature:125 °C ± 2 °C  RGC1/20,1/16S,1/16,1/10,1/8:  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 $\Delta R \le \pm (5\%+0.1\Omega)$	

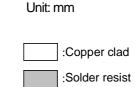
RGC1/32,1/20,1/16S,1/16,1/10,1/8 Page: 9/13

#### 8. Test substrate



**RGC1/8 TEST SUBSTRATE** 





Style	а	b	С	d
RGC1/32	0.2	0.56	0.2	5.3
RGC1/20	0.3	1.5	0.45	5.2
RGC1/16S	0.6	1.9	0.7	4.9
RGC1/16	1.0	3.6	1.0	4.5
RGC1/10	1.2	4.0	1.5	4.3

RGC1/32,1/20,1/16S,1/16,1/10 TEST SUBSTRATE

Figure-3

Remark 1). Material: Epoxide woven glass

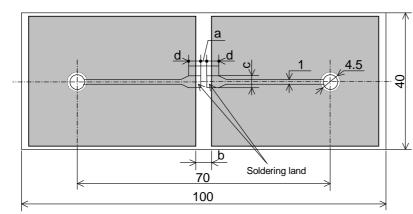
Thickness: 1.6mm Thickness of copper clad: 0.035mm

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.

Page:

FIXED THICK FILM CHIP RESISTORS; RECTANGULAR TYPE & PRECISION

RGC1/32,1/20,1/16S,1/16,1/10,1/8



# Unit: mm :Copper clad :Solder resist

Style	а	b	С	d
RGC1/20	0.3	1.1	0.45	2.15
RGC1/16S	0.6	1.9	0.7	2.0
RGC1/16	1.0	3.6	1.2	3.0
RGC1/10	1.2	4.0	1.65	3.0
RGC1/8	2.5	5.0	2.0	2.5

# RGC BOUND STRENGTH OF THE END FACE PLATING TEST SUBSTRATE

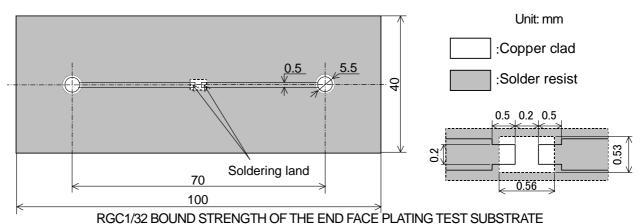
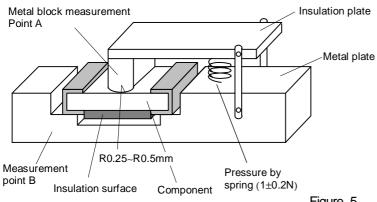


Figure-4

Remark 1). Material: Epoxide woven glass

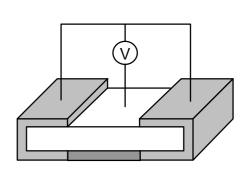
Thickness: 1.6mm Thickness of copper clad: 0.035mm

# • RGC1/16S,1/16,1/10,1/8





# •RGC1/32,1/20



RGC1/32,1/20,1/16S,1/16,1/10,1/8 Page: 11/13

# 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.

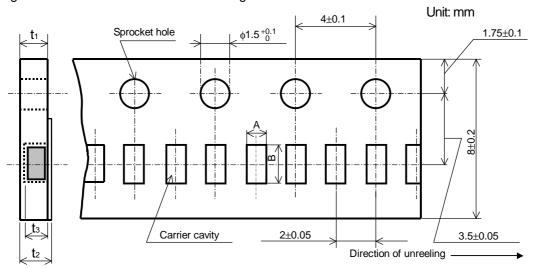
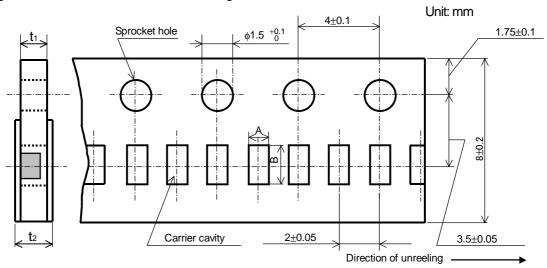


Figure-6 Table-5 Unit: mm В Style RGC1/32 0.24±0.03 0.45±0.03 0.31±0.03 0.36±0.03 0.15±0.02 RGC1/20 0.37±0.05 0.67±0.05 0.42±0.03 0.45±0.05 0.27±0.02

# 9.2.2 Paper taping (8mm width, 2mm pitches)

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



No: RGC-K-HTS-0001

Page:

Title: FIXED THICK FILM CHIP RESISTORS; RECTANGULAR TYPE & PRECISION RGC1/32,1/20,1/16S,1/16,1/10,1/8

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

Taping dimensions shall be in accordance with Figure-8 and Table-7.

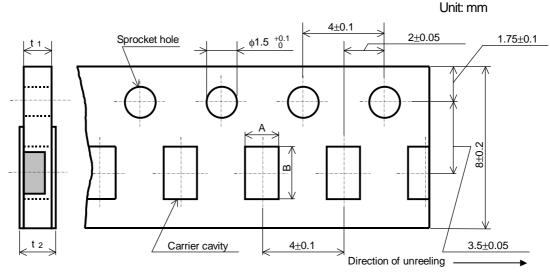
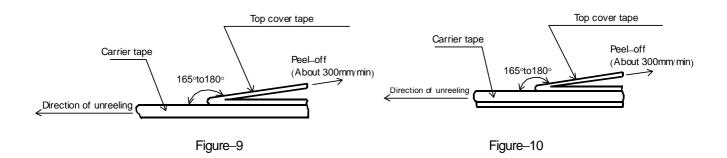


Figure-8

Table_7				Unit: mm
Style	Α	В	<b>t</b> 1	<b>t</b> 2
RGC1/16	$1.15 \pm 0.15$	$1.9 \pm 0.2$	$0.6 \pm 0.1$	0.8max.
RGC1/10	$1.65 \pm 0.15$	$2.5 \pm 0.2$	0.8 ± 0.1	1.0max.
RGC1/8	$2.00 \pm 0.15$	$3.6 \pm 0.2$	0.0 ± 0.1	1.0Hax.

- 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 RGC1/32,1/20: Figure–9, RGC1/16S, 1/16, 1/10, 1/8: Figure–10.
- 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.

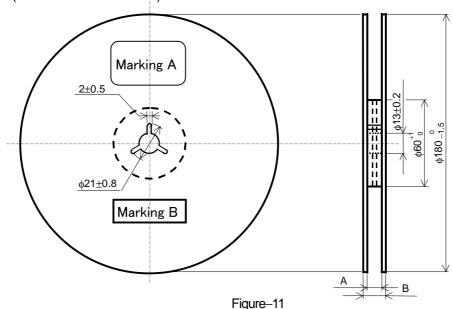


RGC1/32,1/20,1/16S,1/16,1/10,1/8 Page: 13/13

#### 9.3 Reel dimension

Reel dimensions shall be in accordance with the following Figure–11 and Table–8. Plastic reel (Based on EIAJ ET–7200C)

Unit: mm



 Table–8
 Unit: mm

 Style
 A
 B
 Note

 RGC1/32,1/20,1/16S,1/16,1/10,1/8
 9 +1.0 0 11.4±1.0 Injection molding 13±1.0 Vacuum forming

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

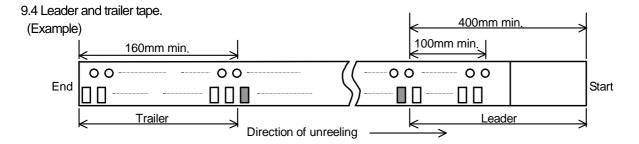


Figure-12

# 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)

# **X-ON Electronics**

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Thick Film Resistors - SMD category:

Click to view products by Kamaya manufacturer:

Other Similar products are found below:

CRCW04028R20JNEE CRCW06036K80FKEE CRG1206F1K58 CRL0603-FW-R700ELF M55342K06B6E19RWL RC1005F1072CS

RC1005F471CS RC1005F4751CS RCP0603W100RGED RCWP72251K47FKWB RLR05C7501GPB14 RLR07C5111FSBSL ERJ
IGMF1R00C ERJ-1GMF1R20C ERJ-1GMF2R55C ERJ-1GMF8R66C 25121WF1003T4E 25.501.3653.0 290-1.0M-RC 292-1.0M-RC 292
2.2K-RC 292-4.7K-RC 25121WF4700T4E 292-470K-RC 302-1.0M-RC CPG1206F10KC CRCW02011R00FXED CRCW060315K0FKEE

CRCW060320K5FKEE CRG0201F10K RCG0402150RFKED RCG04023K92FKED RCP2512B100RGWB RCWP110010R0FKS3

RCWP11002K00FKS3 RCWP12061K00FKS2 3520510RJT 352075KJT M55342K11B9E53RUL RMC16-102JT RMC1JPTE TR0603MR
075K1L 5-2176094-4 35202K7JT WF06Q1000FTL ERJ-S03J1R0V ERJ-S14J4R7U CHP2512L4R30GNT CPCC10270R0JE32

WR12X1621FTL