

RGF series Thick Film Non-Magnetic Chip Resistor

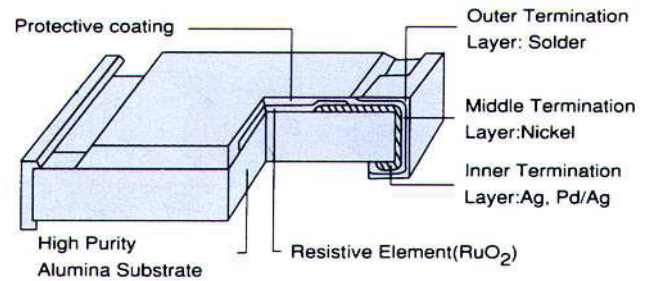
◆ Features

- » Non-magnetic chip resistors by copper plating on middle termination
- » Non-magnetic chip resistors pass 3000 gauss magnetic detection
- » Compatible with flow and reflow soldering
- » Suitable for lead free soldering
- » Meet RoHS compliant
- » RoHS compliant & Halogen Free

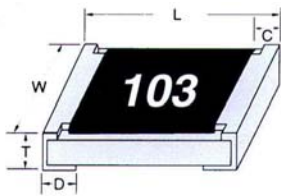
◆ Applications

- » Medical equipment
- » Automotive industry
- » MRI industry
- » Measurement instrument

◆ Configuration



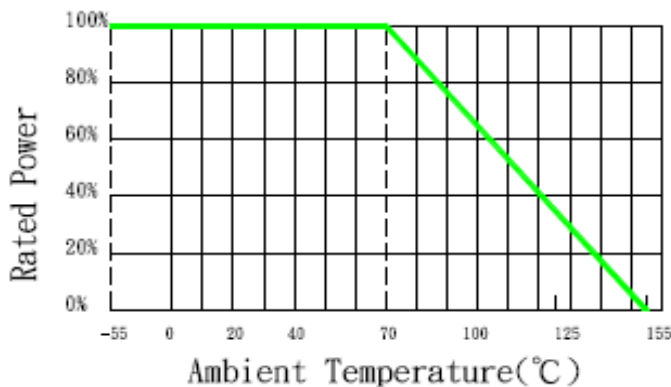
◆ Dimensions



Size	L	W	C	D	T
0603	1.60±0.10	0.80±0.10	0.30±0.20	0.30±0.20	0.45±0.15
0805	2.00±0.10	1.25±0.10	0.40±0.20	0.40±0.20	0.50±0.15
1206	3.10±0.10	1.60±0.10	0.50±0.25	0.50±0.25	0.55±0.15

Unit: mm

◆ Power Derating Curve



◆ Rating

Lead Free Chip Resistor

Type	Power Rating at 70°C	Max. RCWV	Max. Overload Voltage	Resistance Tolerance (%)	Temperature Coefficient (ppm/°C)	Resistance Range		Standard Resistance Values
						Min.	Max.	
RGF0603	1/10W	50V	100V	± 1% (F)	± 100	1Ω	10MΩ	E-96
				± 5% (J)	± 200	0Ω & 1Ω	10MΩ	E-24
RGF0805	1/8W	150V	300V	± 1% (F)	± 100	1Ω	10MΩ	E-96
				± 5% (J)	± 200	0Ω & 1Ω	10MΩ	E-24
RGF1206	1/4W	200V	400V	± 1% (F)	± 100	1Ω	10MΩ	E-96
				± 5% (F)	± 200	0Ω & 1Ω	10MΩ	E-24

Jumper: ◎ 0603 size maximum resistance $R_{max} \leq 50m\Omega$ and rated current $IR \leq 1A$

◎ 0805, 1206 size maximum resistance $R_{max} \leq 50m\Omega$ and rated current $IR \leq 2A$

1Ω ~ 10Ω: ◎ Temperature Coefficient of Resistance for 0603, 0805, 1206 = -300 ~ +500

$E = (P \times R)^{1/2}$ E: Working Voltage (V), P: Rated Power (W), R: Resistance Value (Ω)

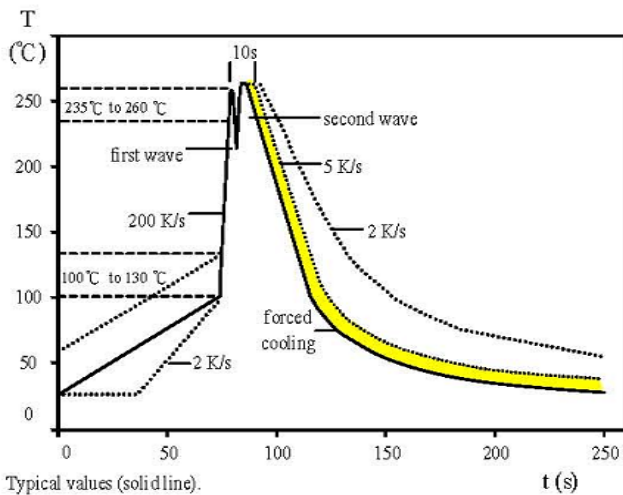
◆ Part Number

RGF	0805	F	10K	□	□□
Type	Size	Tolerance	R Value	Reel Size	Package Quantity
RGF	0603	F: ± 1%	10KΩ = 10K	Blank = 7"	(standard package As below)
	0805	J: ± 5%	0Ω = 0R	B= 13"	10= 10K per reel
	1206		2.2MΩ = 2M2	C= 10"	20= 20K per reel
					08= 8K per reel
					16= 16K per reel

» Standard Package Q'ty for each size is as following.

TYPE	Standard Package Q'ty
RGF0603	5K per reel
RGF0805	5K per reel
RGF1206	5K per reel

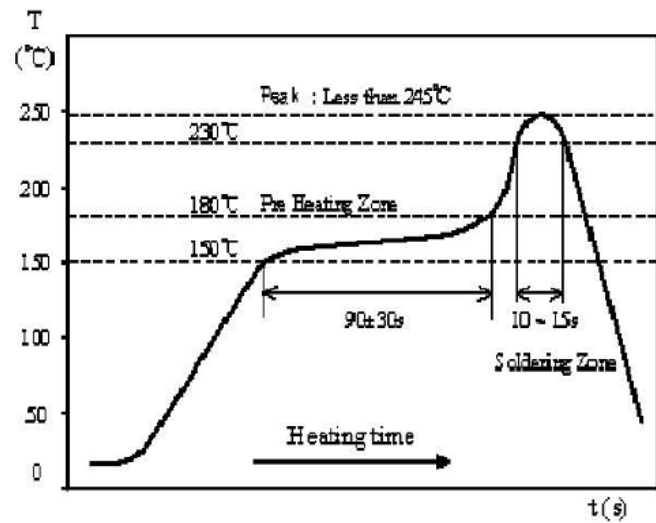
◆ Soldering Temperature Curve



Typical values (solid line).

Process limits (dotted line).

WAVE soldering.



IR Reflow Soldering

◆ Resistance Temperature Curve

E-24 SERIES



3 digit marking for $\pm 5\%$ E24

Examples: **473** $47 \times 10^3 = 47K\Omega$

1R5 = 1.5Ω

0R = 0Ω

E-96 SERIES



4 digit marking for E96

Examples: **1542** $154 \times 10^2 = 15K4\Omega$

22R1 = 22.1Ω



3 digit marking for E96 - 0603

Examples : **02C** (table 1)

$102 \times 10^2 = 10K2\Omega$

◆ **0603 1% Marking Table (Table 1)**

Code	E48	E96	Code	E48	E96	Code	E48	E96	Code	E48	E96
01	100	100	25	178	178	49	316	316	73	562	562
02		102	26		182	50		324	74		576
03	105	105	27	187	187	51	332	332	75	590	590
04		107	28		191	52		340	76		604
05	110	110	29	196	196	53	348	348	77	619	619
06		113	30		200	54		357	78		634
07	115	115	31	205	205	55	365	365	79	649	649
08		118	32		210	56		374	80		665
09	121	121	33	215	215	57	383	383	81	681	681
10		124	34		221	58		392	82		698
11	127	127	35	226	226	59	402	402	83	715	715
12		130	36		232	60		412	84		732
13	133	133	37	237	237	61	422	422	85	750	750
14		137	38		243	62		432	86		768
15	140	140	39	249	249	63	442	442	87	787	787
16		143	40		255	64		453	88		806
17	147	147	41	261	261	65	464	464	89	825	825
18		150	42		267	66		475	90		845
19	154	154	43	274	274	67	487	487	91	866	866
20		158	44		280	68		499	92		887
21	162	162	45	287	287	69	511	511	93	909	909
22		165	46		294	70		523	94		931
23	169	169	47	301	301	71	536	536	95	953	953
24		174	48		309	72		549	96		976

Code	A	B	C	D	E	F	G	H	X	Y	Z
Multiplier	10^0	10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	10^{-1}	10^{-2}	10^{-3}

E3	10				22				47								
E6	10		15		22		33		47		68						
E12	10	12	15	18	22	27	33	39	47	56	68	82					
E24	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47
	51	56	62	68	75	82	91										
E96	100	102	105	107	110	113	115	118	121	124	127	130	133	137	140	143	147
	150	154	158	162	165	169	174	178	182	187	191	196	200	205	210	215	221
	226	232	237	243	249	255	261	267	274	280	287	294	301	309	316	324	332
	340	348	357	365	374	383	392	402	412	422	432	442	453	464	475	487	499
	511	523	536	549	562	576	590	604	619	634	649	665	681	698	715	732	750
	768	787	806	825	845	866	887	909	931	953	976						

◆ Specification

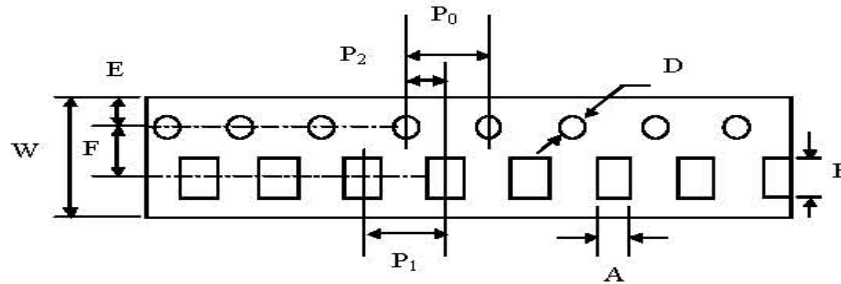
Specification and Test Method

TEST	SPECIFICATION	TEST METHOD
DC Resistance	F: $\pm 1\%$ J: $\pm 5\%$	IEC 60115-1 / JIS C 5201-1 , Clause 4.5 Measure the resistance Value.
Short Time Overload	F: $\Delta R \leq \pm (1\% + 0.05\Omega)$ J: $\Delta R \leq \pm (2\% + 0.1\Omega)$	IEC 60115-1 / JIS C 5201-1 , Clause 4.13 2.5 × Rated voltage or Max. Overload Voltage for 5 sec. measure resistance after 30 minutes
Solderability	Over 95% of termination must be covered with solder	IEC 60115-1 / JIS C 5201-1, Clause 4.17 After immersing flux, dip in the $245 \pm 2^\circ\text{C}$ molten solder bath for 3 ± 0.5 sec.
Resistance to solder Heat	F: $\Delta R \leq \pm (0.5\% + 0.05\Omega)$ J: $\Delta R \leq \pm (1\% + 0.1\Omega)$ No mechanical damage	IEC 60115-1 / JIS C 5201-1 , Clause 4.18 With $260 \pm 5^\circ\text{C}$ for 10 ± 1 sec
Load Life Humidity	F: $\Delta R \leq \pm (1\% + 0.05\Omega)$ J: $\Delta R \leq \pm (3\% + 0.1\Omega)$	IEC 60115-1 / JIS C 5201-1 , Clause 4.24 Maintain the temperature of the resistor at $40 \pm 2^\circ\text{C}$ and 90% ~ 95% R.H. with the rated voltage applied. Cycle ON for 1.5 hours and OFF for 0.5 hour for 1000+48/-0 hours. After 1 ~ 4 hours, measure the resistance value.
Temperature Coefficient of Resistance (TCR)	Refer to the rating table information	IEC 60115-1 / JIS C 5201-1 , Clause 4.8 Test temperature : $25^\circ\text{C}(T1) \rightarrow -55^\circ\text{C}(T2)$ $25^\circ\text{C}(T1) \rightarrow +155^\circ\text{C}(T2)$ $\text{TCR} (\text{ppm}/^\circ\text{C}) = \frac{R2 - R1}{R1} \times \frac{1}{T2 - T1} \times 10^6$ T1: 25°C T2: Test temperature R1: Resistance at reference temperature (T1) R2: Resistance at test temperature (T2)
Load Life	F: $\Delta R \leq \pm (1\% + 0.05\Omega)$ J: $\Delta R \leq \pm (3\% + 0.1\Omega)$	IEC 60115-1 / JIS C 5201-1 , Clause 4.25 Permanent resistance change after 1000+48/-0 hours (1.5 hours ON, 0.5 hour OFF) at RCWV or Max. Keep the resistor at $70 \pm 2^\circ\text{C}$ ambient.
Temperature Cycle	F: $\Delta R \leq \pm (0.5\% + 0.05\Omega)$ J: $\Delta R \leq \pm (1\% + 0.1\Omega)$ No mechanical damage	IEC 60115-1 / JIS C 5201-1 , Clause 4.19 Repeat 5 cycles as follows -55°C (30min.) $\rightarrow +25^\circ\text{C}$ (2~3min.) $\rightarrow +155^\circ\text{C}$ (30min.) $\rightarrow +25^\circ\text{C}$ (2~3min.)
Insulation Resistance	Between termination and coating must be over 1000MΩ	IEC 60115-1 / JIS C 5201-1 , Clause 4.6 Test voltage : $100 \pm 15\text{V}$
Bending strength	F: $\Delta R \leq \pm (0.5\% + 0.05\Omega)$ J: $\Delta R \leq \pm (1\% + 0.1\Omega)$ No mechanical damage	IEC 60115-1 / JIS C 5201-1 , Clause 4.33 Resistance changes after bended on the 90mm PCB. Bend : 3mm for 0603, 0805, 2mm for 1206

◆ Packing

Tape and Reel package

Taping specs are according to EIA RS-481

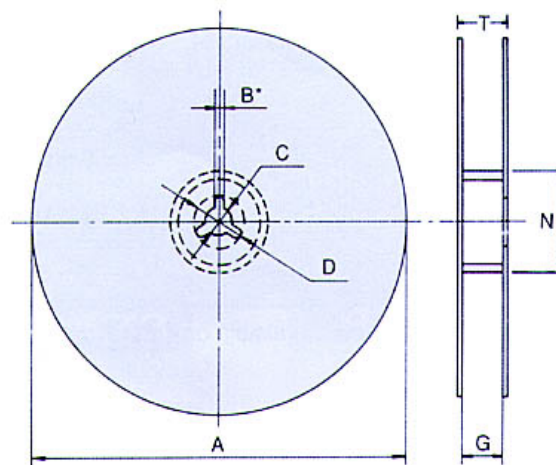


Accumulated dimensional tolerance $40\pm 0.2\text{mm}$

Size	A	B	W	F	E	P1	P2	P0	D
0603	1.10 ± 0.20	1.90 ± 0.20	8.00 ± 0.30	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50+0.10/-0$
0805	1.65 ± 0.20	2.40 ± 0.20	8.00 ± 0.30	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50+0.10/-0$
1206	2.00 ± 0.20	3.60 ± 0.20	8.00 ± 0.30	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50+0.10/-0$

Unit: mm

Reel Package



Size	Packing Q'ty	A	N	C	D	B	G	T
0603 0805 1206	5kpcs/Reel	178.0 ± 2.0	60.0 ± 0.5	13.0 ± 0.5	20(Min.)	2.0 ± 0.5	10.0 ± 1.5	14.9max.
	10kpcs/Reel	254.0 ± 2.0	100.0 ± 1.0	13.5 ± 0.5	20(Min.)	2.0 ± 0.5	10.0 ± 1.5	14.9max.
	20kpcs/Reel	330.0 ± 2.0	100.0 ± 1.0	13.5 ± 0.5	20(Min.)	2.0 ± 0.5	10.0 ± 1.5	14.9max.

Unit: mm