

RWF series Thick Film Automotive Chip Resistor

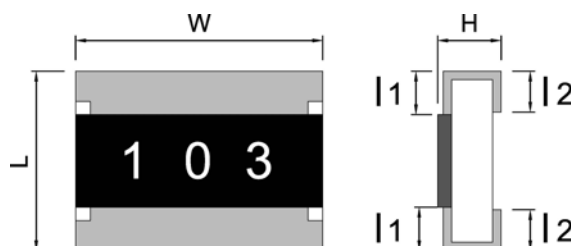
◆ Features

- » Meet AEC-Q200 test for Automotive industry
- » Suitable for lead free soldering
- » Compatible with wave and reflow soldering
- » RoHS compliant & Halogen Free

◆ Applications

- » Automotive Industry
- » General Electronic devices

◆ Dimensions



Size	L	W	C	I1	I2
0402	1.00±0.05	0.50±0.05	0.30±0.10	0.15±0.10	0.20±0.10
0603	1.60±0.20	0.80±0.15	0.40±0.10	0.30±0.20	0.30±0.10
0805	2.00±0.20	1.25±0.15	0.50±0.15	0.30±0.15	0.40±0.15
1206	3.05±0.10	1.60±0.20	0.55±0.15	0.40±0.20	0.50±0.20
1210	3.05±0.10	2.50±0.20	0.55±0.15	0.50±0.20	0.50±0.20
1812	4.50±0.10	3.10±0.20	0.55±0.05	0.55±0.25	0.70±0.20
2010	5.00±0.20	2.50±0.20	0.55±0.10	0.60±0.25	0.60±0.20
1218	3.10±0.10	4.60±0.10	0.55±0.05	0.40±0.20	0.50±0.20
2512	6.30±0.20	3.20±0.20	0.55±0.10	0.60±0.25	0.60±0.20

Unit: mm

◆ Standard & High Power Electrical Specifications

Item Type	Rated Power at 70℃		Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/℃)	Resistance Range			Operating Temperature Range
	Standard	High				B(±0.1%) D(±0.5%)	F(±1%) G(±2%)	J(±5%) K(±10%)	
0402	0.063 W	-	50V	100V	0~+400	-	1Ω~9.9Ω	1Ω~9.9Ω	-55℃ ~ +155℃
					±300	-	10Ω~990Ω	10Ω~990Ω	
					±200	10Ω~1MΩ	1KΩ~10MΩ	1KΩ~10MΩ	
0603	0.1 W 0.125 W		50V	100V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω	
					±200	-	-	10Ω~10MΩ	
					±100	10Ω~1MΩ	10Ω~10MΩ	-	
0805	0.125 W 0.25 W		150V	300V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω	
					±200	-	-	10Ω~10MΩ	
					±100	10Ω~1MΩ	10Ω~10MΩ	-	
1206	0.25 W 0.5 W		200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω	
					±200	-	-	10Ω~10MΩ	
					±100	10Ω~1MΩ	10Ω~10MΩ	-	
1210	0.33 W 0.66 W		200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω	
					±200	-	-	10Ω~10MΩ	
					±100	10Ω~1MΩ	10Ω~10MΩ	-	
1812	0.5 W 1 W		200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω	
					±200	-	-	10Ω~10MΩ	
					±100	10Ω~1MΩ	10Ω~10MΩ	-	
2010	0.5 W 1 W		200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω	
					±200	-	-	10Ω~10MΩ	
					±100	10Ω~1MΩ	10Ω~10MΩ	-	
1218	1 W -		200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω	
					±200	-	-	10Ω~10MΩ	
					±100	10Ω~1MΩ	10Ω~10MΩ	-	
2512	1 W 2 W		200V	400V	±400	-	1Ω~9.9Ω	1Ω~9.9Ω	
					±200	-	-	10Ω~10MΩ	
					±100	10Ω~1MΩ	10Ω~10MΩ	-	

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55℃ ~ +155℃ .

◆ Low Ohm for Standard

Item Type	Rated Power at 70℃	Rated Voltage	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/℃)	Resistance Range (mΩ)	Operating Temperature Range
						F(±1%) J(±5%)	
0402	0.063 W	0.17~0.25V	0.25 V	0.624 V	±800	470~990	-55℃ ~ +155℃
0603	0.1 W	0.1~0.31V	0.31 V	0.775 V	±800	100~330	
					±600	331~510	
					±400	511~990	
0805	0.125 W	0.04~0.35V	0.35 V	0.875 V	±1000	10~50	
					±800	51~100	
					±600	101~330	
					±400	331~990	
1206	0.25 W	0.05~0.5V	0.5 V	1.25 V	±800	10~50	
					±600	51~100	
					±500	101~330	
					±400	331~990	
1210	0.33 W	0.06~0.57V	0.57 V	1.425 V	±800	10~50	
					±600	51~100	
					±500	101~330	
					±400	331~990	
1812	0.5 W	0.07~0.7V	0.7 V	1.75 V	±800	10~50	
					±600	51~100	
					±500	101~330	
					±400	331~990	
2010	0.5 W	0.07~0.7V	0.7 V	1.75 V	±800	10~50	
					±800	51~100	
					±600	101~330	
					±400	331~990	
1218	1 W	0.1~0.99V	0.99 V	2.475V	±800	10~50	
					±400	51~990	
2512	1 W	0.1~0.99V	0.99 V	2.475V	±800	10~50	
					±700	51~100	
					±500	101~330	
					±400	331~990	

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55℃~+155℃.

◆ Low Ohm for High Power

Item Type	Rated Power at 70 °C	Rated Voltage	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range (mΩ)	Operating Temperature Range
						F(±1%) J(±5%)	
0603	0.125 W	0.11~0.35V	0.352 V	0.879 V	±800 ±600 ±400	100~330 331~510 511~990	-55℃ ~ +155℃
0805	0.25 W	0.05~0.5V	0.497 V	1.244 V	±1000 ±800 ±600 ±400	10~50 51~100 101~330 331~990	
1206	0.5 W	0.07~0.7V	0.704 V	1.759 V	±800 ±600 ±500 ±400	10~50 51~100 101~330 331~990	
1210	0.66 W	0.08~0.81V	0.808 V	2.021 V	±800 ±600 ±500 ±400	10~50 51~100 101~330 331~990	
1812	1 W	0.1~0.99V	0.995 V	2.487 V	±800 ±600 ±500 ±400	10~50 51~100 101~330 331~990	
2010	1 W	0.1~0.99V	0.995 V	2.487 V	±800 ±800 ±600 ±400	10~50 51~100 101~330 331~990	
2512	2 W	0.14~1.41V	1.407 V	3.518 V	±800 ±700 ±500 ±400	10~50 51~100 101~330 331~990	

● For non-standard parts, please contact our sales dept.

● Operating Temperature Range : -55℃ ~ +155℃.

◆ Standard & High Power for High Ohm

Item Type	Rated Power at 70℃		Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/℃)	Resistance Range		Operating Temperature Range
	Standard	High Power				F(±1%)	J(±5%)	
0402	0.063 W	-	50V	100V	±200	10.1 M Ω ~ 54 M Ω	10.1 M Ω ~ 100 M Ω	-55℃ ~ +155℃
0603	0.1 W	0.125 W	50V	100V				
0805	0.125 W	0.25 W	150V	300V				
1206	0.25 W	0.5 W	200V	400V				
1210	0.33 W	0.66 W	200V	400V				
1812	0.5 W	1 W	200V	400V				
2010	0.5 W	1 W	200V	400V				
1218	1 W	-	200V	400V				
2512	1 W	2 W	200V	400V				

● For non-standard parts, please contact our sales dept.

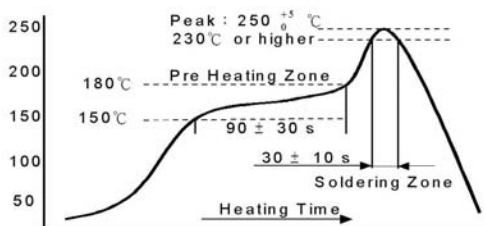
◆ Part Number

RWF	0805	F	10K	<input type="checkbox"/>	<input type="checkbox"/>	W
Type	Size	Tolerance	R value	Reel Size	Package Quantity	TCR
	0402	F: $\pm 1\%$	$0\Omega = 0R$	Blank =	7" (Standard Size As below)	Blank: Standard
RWF	0603	G: $\pm 2\%$	$10K\Omega = 10K$	B= 13"	10= 10K per reel	C: ± 25
	0805	J: $\pm 5\%$	$2.2K\Omega = 2K2$	C= 10"	20= 20K per reel	
	1206	B: $\pm 0.1\%$				
	1210	D: $\pm 0.5\%$				
	1812					
	2010					
	1218					
	2512					

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

TYPE	Standard Package Q'ty
RWF0402	10K per reel
RWF0603	5K per reel
RWF0805	5K per reel
RWF1206	5K per reel
RWF1210	5K per reel
RWF1812	4K per reel
RWF2010	4K per reel
RWF1218	4K per reel
RWF2512	4K per reel

◆ Specification and Test Method

Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS C 5201-1 clause 4.8	-55℃ ~ +155℃, 25℃ is the reference temperature	Refer to Ratings
Short Time Overload	JIS C 5201-1 clause 4.13	General : 2.5 times RCWV or Max. Overload voltage whichever is less for 5 seconds. High Power : 2.5 times RCWV or Max. Overload voltage whichever is less for 2 seconds.	±1 : ±(1.0%+0.05Ω) ±5 : ±(2.0%+0.1Ω)
IR Reflow	Sony SS-00254		±1 : ±(1.0%+0.05Ω) ±5 : ±(1.0%+0.05Ω)
Leaching	Sony SS-00254-9	260±5℃ for 30 seconds.	>95% Coverage
Soldering Heat	JIS C 5201-1 clause 4.18	260±5℃ for 10 seconds.	±1 : ±(0.5%+0.05Ω) ±5 : ±(1.0%+0.05Ω)
Temperature Cycling	JIS C 5201-1 clause 4.19	-55℃ to +155℃, 5 cycles	0.1%、0.5%、1% : ±(0.5%+0.05Ω) 2%、5% : ±(1.0%+0.10Ω)
Electric Iron	Sony SS-00254-5	Preheating temperature : 350±10℃ Electric iron preheating time : 3+1/-0 sec	±1 : ±(1.0%+0.05Ω) ±5 : ±(1.0%+0.05Ω)
Resistance to Solvent	JIS C 5201-1 clause 4.29	The tested resistor be immersed into isopropyl alcohol of 20~25℃ for 60 secs. Then the resistor is left in the room for 48 hrs.	±1 : ±(0.5%+0.05Ω) ±5 : ±(0.5%+0.05Ω)
Load Life in Humidity	JIS C 5201-1 clause 4.24	40±2℃, 90~95% R.H. RCWV or Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" .	0.1%、0.5%、1% : ±(0.5%+0.05Ω) 2%、5% : ±(2.0%+0.05Ω)
Load Life (Endurance)	JIS C 5201-1 clause 4.25	70±2℃, RCWV or Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" .	0.1%、0.5%、1% : ±(1.0%+0.05Ω) 2%、5% : ±(3.0%+0.10Ω)
Terminal Bending Strength	JIS C 5201-1 clause 4.33	Bending once for 5 seconds D : 0402、0603、0805=5mm 1206、1210、1812=3mm 1218、2010、2512、2030=2mm	±1 : ±(1.0%+0.05Ω) ±5 : ±(1.0%+0.05Ω)
Insulation Resistance	JIS C 5201-1 clause 4.6	100V for 1 minute.	≥ 10GΩ

AEC-Q200 test			
Test Item	Test Method	Procedure	Requirements
Temperature Cycling	JESD22 Method JA-104	1000 Cycles (-55°C to +125°C) Measurement at 24± 4 hours after test conclusion.	0.1% 、 0.5% 、 1% : $\pm(0.5\%+0.05\Omega)$ 2% 、 5% : $\pm(1.0\%+0.10\Omega)$
Resistance to Solvent	MIL-STD-202 Method 215	Add Aqueous wash chemical-OKEM clean or equivalent.	$\pm 1 : \pm(0.5\%+0.05\Omega)$ $\pm 5 : \pm(0.5\%+0.05\Omega)$
Biased Humidity	MIL-STD-202 Method 103	1000 hours 85°C/85%RH.	0.1% 、 0.5% 、 1% : $\pm(0.5\%+0.05\Omega)$ 2% 、 5% : $\pm(2.0\%+0.05\Omega)$
High Temperature Exposure (Storage)	MIL-STD-202 Method 108	1000 hrs. @ T=125°C.	0.1% 、 0.5% 、 1% : $\pm(0.5\%+0.05\Omega)$ 2% 、 5% : $\pm(2.0\%+0.05\Omega)$
Operation Life	MIL-STD-202 Method 108	125°C , or Max.working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5hr "OFF"	0.1% 、 0.5% 、 1% : $\pm(1.0\%+0.05\Omega)$ 2% 、 5% : $\pm(3.0\%+0.10\Omega)$
External Visual	MIL-STD-883 Method 2009	Electrical test not required. Inspect device construction, marking and workmanship.	—
Mechanical Shock	MIL-STD-202 Method 213	Impact acceleration : 1500g Pulse duration : 0.5ms Number of shocks : 30 shocks(5 shocks for each face)	$\pm 1 : \pm(1.0\%+0.05\Omega)$ $\pm 5 : \pm(2.0\%+0.1\Omega)$
Vibration	MIL-STD-202 Method 204	5 g's for 20min., 12 cycles each of 3 orientations.	$\pm 1 : \pm(1.0\%+0.05\Omega)$ $\pm 5 : \pm(2.0\%+0.1\Omega)$
ESD	ACE-Q200-002 or ISO/DIS 10605	0402 / 0603 : 1KV 0805 and above : 2KV	For the product %
Solderability	J-STD-002	(1) 4 hrs 155°C dry heat (2) 260±5°C 10 sec.	$\pm 1 : \pm(0.5\%+0.05\Omega)$ $\pm 5 : \pm(1.0\%+0.05\Omega)$
Board Flex	AEC Q200-005	Beading once for 60 seconds	$\pm 1 : \pm(1.0\%+0.05\Omega)$ $\pm 5 : \pm(1.0\%+0.05\Omega)$