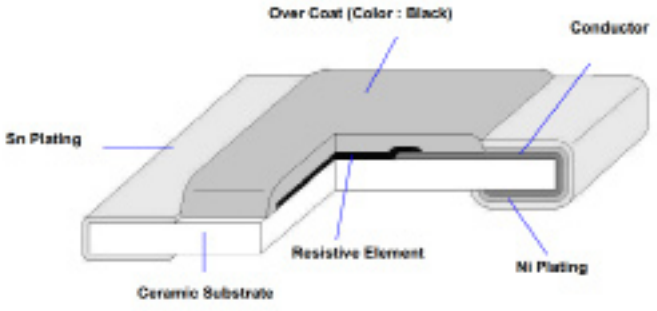
LEADFREE
RoHS Compliant

FEATURES

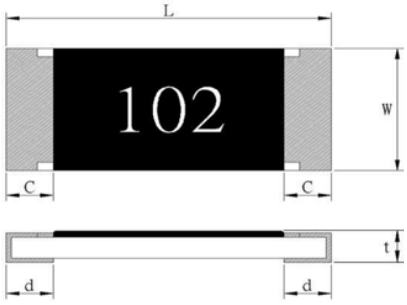
- Resistances from 1Ω to 10MΩ
- 1% and 5% tolerances
- Automotive AEC-Q200
- Anti-Surge
- Pulse Withstanding
- RoHS compliant / lead-free
- Operating Temperature: -55°C to +155°C

CONSTRUCTION



MECHANICAL SPECIFICATIONS

Type	L	W	c	d	t	Units
RMCF04/RMCFP04 (0402)	1.00 ± 0.10	0.30 ± 0.03	0.15 ± 0.05	0.20 ± 0.10	0.35 ± 0.05	mm
RMCF06/RMCFP06 (0603)	1.60 ± 0.10	0.80 ± 0.10	0.30 ± 0.20	0.30 ± 0.20	0.45 ± 0.10	mm
RMCF10/RMCFP10 (0805)	2.00 ± 0.10	1.25 ± 0.10	0.35 ± 0.20	0.40 ± 0.20	0.50 ± 0.10	mm
RMCF18/RMCFP18 (1206)	3.10 ± 0.20	1.55 ± 0.10	0.50 ± 0.30	0.50 ± 0.25	0.55 ± 0.10	mm
RMCF20/RMCFP20 (1210)	3.05 ± 0.10	2.50 ± 0.20	0.50 ± 0.30	0.50 ± 0.20	0.55 ± 0.20	mm
RMCF26/RMCFP26 (1812)	4.50 ± 0.10	3.10 ± 0.20	0.55 ± 0.20	0.70 ± 0.20	0.55 ± 0.05	mm
RMCF22/RMCFP22 (2010)	5.00 ± 0.20	2.50 ± 0.20	0.60 ± 0.20	0.60 ± 0.20	0.55 ± 0.10	mm
RMCF24/RMCFP22 (2512)	6.35 ± 0.20	3.20 ± 0.20	0.60 ± 0.20	0.60 ± 0.20	0.55 ± 0.10	mm



PART NUMBERING SYSTEM

RMCF04 — 100 J T

Type	Size	Wattage
RMCF04	0402	1/16W
RMCFP04	0402	1/8W
RMCF06	0603	1/10W
RMCFP06	0603	1/4W
RMCF10	0805	1/8W
RMCFP10	0805	1/3W
RMCF18	1206	1/4W
RMCFP18	1206	1/2W
RMCF20	1210	1/2W
RMCFP20	1210	2/3W
RMCF26	1812	3/4W
RMCFP26	1812	1W
RMCF22	2010	3/4W
RMCFP22	2010	1W
RMCF24	2512	1W
RMCFP24	2512	2W

Resistance Tolerance	
F	1%
J	5%

Packaging	
Code	Description
T	Tape & Reel

3 DIGIT CODE (5% Tolerance)							
Resistance Value							
Code	1R0	100	101	102	103	104	105
Values	1Ω	10Ω	100Ω	1KΩ	10K	100K	1M

5% Tolerance: First two digits are significant figures and third digit is number of zeros.
Letter "R" indicates decimal values under 100 ohms.

4 DIGIT CODE (1% Tolerance)						
Resistance Value						
Code	10R0	1000	1001	1002	1003	1004
Values	10Ω	100Ω	1K	10K	100K	1M

1% Tolerance: First three digits are significant figures and fourth digit is number of zeros.
Letter "R" indicates decimal values under 100 ohms.

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ELECTRICAL SPECIFICATIONS

Type	Package Type	Power Rating (Watts) @ 70°C	Maximum Working Voltage*	Maximum Overload Voltage	Temperature Coefficient (PPM / °C)	Resistance Range	
						1% E-96 & E-24	5% E-24
RMCF04	0402	1/16W	50V	100V	±100	100Ω ~ 1MΩ	
					±200	10Ω ≤ R < 10Ω 1MΩ ≤ R < 10MΩ	1Ω ~ 10Ω 1MΩ ~ 10MΩ
RMCFP04	0402	1/8W	50V	100V	±100	10Ω ~ 1MΩ	
					±200	1Ω ≤ R < 10Ω	
RMCF06	0603	1/10W	75V	150V	±100	100Ω ~ 1MΩ	
					±200	10Ω ≤ R < 10Ω 1MΩ ≤ R < 10MΩ	1Ω ~ 10Ω 1MΩ ~ 10MΩ
RMCFP06	0603	1/4W	75V	150V	±100	10Ω ~ 1MΩ	
					±200	1Ω ≤ R < 10Ω	
RMCF10	0805	1/8W	150V	300V	±100	100Ω ~ 1MΩ	
					±200	10Ω ≤ R < 10Ω 1MΩ ≤ R < 10MΩ	1Ω ~ 10Ω 1MΩ ~ 10MΩ
RMCFP10	0805	1/3W	150V	300V	±100	10Ω ~ 1MΩ	
					±200	1Ω ≤ R < 10Ω	
RMCF18	1206	1/4W	200V	400V	±100	100Ω ~ 1MΩ	
					±200	10Ω ≤ R < 10Ω 1MΩ ≤ R < 10MΩ	1Ω ~ 10Ω 1MΩ ~ 10MΩ
RMCFP18	1206	1/2W	200V	400V	±100	10Ω ~ 1MΩ	
					±200	1Ω ≤ R < 10Ω	
RMCF20	1210	1/2W	200V	400V	+100	10Ω ~ 1MΩ	10Ω ~ 10MΩ
					+400	1Ω ~ 9.1Ω	1Ω ~ 9.1Ω
RMCFP20	1210	2/3W	200V	400V	+100	10Ω ~ 1MΩ	10Ω ~ 10MΩ
					+400	1Ω ~ 9.1Ω	1Ω ~ 9.1Ω
RMCF26	1812	3/4W	200V	400V	+100	10Ω ~ 1MΩ	10Ω ~ 10MΩ
					+400	1Ω ~ 9.1Ω	1Ω ~ 9.1Ω
RMCFP26	1812	1W	200V	400V	+100	10Ω ~ 1MΩ	10Ω ~ 10MΩ
					+400	1Ω ~ 9.1Ω	1Ω ~ 9.1Ω
RMCF22	2010	3/4W	200V	400V	+100	10Ω ~ 1MΩ	10Ω ~ 10MΩ
					+400	1Ω ~ 9.1Ω	1Ω ~ 9.1Ω
RMCFP22	2010	1W	200V	400V	+100	10Ω ~ 1MΩ	10Ω ~ 10MΩ
					+400	1Ω ~ 9.1Ω	1Ω ~ 9.1Ω
RMCF24	2512	1W	200V	400V	+100	10Ω ~ 1MΩ	10Ω ~ 10MΩ
					+400	1Ω ~ 9.1Ω	1Ω ~ 9.1Ω
RMCFP24	2512	2W	200V	400V	+100	10Ω ~ 1MΩ	
					+400	1Ω ~ 9.1Ω	10Ω ~ 10MΩ

Zero Ohm Jumper < 0.05Ω

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ELECTRICAL SPECIFICATIONS

Item	Reference Standard	Condition of Test	Test Limit ΔR
Temperature Coefficient of Resistance	IEC 60115-1 4.8	-AT +25/-55°C and +25/+125°C	±(1% + 0.05Ω)
Short Time Overload	IEC 60115-1 4.13	2.5 times rated voltage for 5 sec.	±(1% + 0.05Ω) Remarks: 0402 : ±(2% + 0.1Ω) 0Ω : 50mΩ or less
High Temperature Exposure (Storage)	AEC-Q200-REV C-Test 3 MIL-STD-202 Method 108	1000hours @ T=125°C Unpowered. Measurement at 24±2 hours after test conclusion.	0.5%, 1%: ±(1.0% + 0.05Ω) 5%: ±(2.0% + 0.1Ω) 0Ω : 50mΩ or less
Moisture Resistance	AEC-Q200-REV C-Test 6 MIL-STD-202 Method 106	T=24 hours / Cycle, 10 Cycle. Notes: Step 7a & 7b not required. Unpowered	0.5%, 1%: ±(1.0% + 0.05Ω) 5%: ±(2.0% + 0.1Ω) 0Ω : 50mΩ or less
Biased Humidity	AEC-Q200-REV C-Test 7 MIL-STD-202 Method 103	1000 hours 85°C / 85%RH. Note: Specified conditions: 10% of operating power (not exceeding max. working voltage). Measurement at 24±2 hours after test conclusion.	±(3% + 0.1Ω) 0Ω : 100mΩ or less
Operational Life	AEC-Q200-REV C-Test 8 MIL-STD-202 Method 108	1000 hours TA = 70°C at rated power. Measurement at 24±2 hours after test conclusion.	0.5%, 1%: ±(1.0% + 0.1Ω) 5%: ±(2.0% + 0.1Ω) 0Ω : 100mΩ or less
External Visual	AEC-Q200-REV C-Test 9 MIL-STD-883 Method 2009	Electrical test not required. Inspect device construction. Marking and workma nship.	
Physical Dimension	AEC-Q200-REV C-Test 10 MIL-STD-202 Method JB-100	Verify physical dimensions to the applicable device detail specification. Note: User(s) and Suppliers spec. Electrical test not required.	
Resistance to Solvents	AEC-Q200-REV C-Test 12 MIL-STD-202 Method 215	a: Isopropyl Alcohol : Mineral Spirits = 1-3 b: Terpene Defluxer (Bioact EC-7R) c: Deinonized water : Propylene Glycol : monomethyl Ether : Monoethanolamine = 42 : 1 : 1	Marking and protective layer can not be detached
Mechanical Shock	AEC-Q200-REV C-Test 13 MIL-STD-202 Method 213	Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration(d) is 6(ms).	±(1% + 0.1Ω) 0Ω : 50mΩ or less
Vibration	AEC-Q200-REV C-Test 14 MIL-STD-202 Method 204	5g's for min., 12 cycles each of 3 orientations. Note: Test from 10-2000Hz	±(1% + 0.1Ω) 0Ω : 50mΩ or less
Resistance to Soldering Heat	AEC-Q200-REV C-Test 15 MIL-STD-202 Method 210	Condition B: Immerse the specimens in an eutectic solder at 260±5°C for 10±1s.	0.5%, 1%: ±(0.5% + 0.05Ω) 5%: ±(1.0% + 0.1Ω) 0Ω : 50mΩ or less
Thermal Shock	AEC-Q200-REV C-Test 16 MIL-STD-202 Method 107	-55°C/+155°C. Note: Number of cycles required-300, Maximum transfer time-20 seconds, Dwell time-15 minutes. Air-Air.	±(1% + 0.1Ω) 0Ω : 50mΩ or less
ESD	AEC-Q200-REV C-Test 17	Verify voltage setting at 500V	±(1% + 0.1Ω)
Solderability	AEC-Q200-REV C-Test 18 J-STD-002	Method B, aging 4 hours at 155°C dry heat Lead-Free solder bath at 245±3°C Dipping time: 3±0.5 seconds	> 95% area covered with tin
Flammability	AEC-Q200-REV C-Test 17 UL-94	V-0 or V-1 are acceptable. Electrical test not required.	V-0 or 0-1
Board Flex (Bending)	AEC-Q200-REV C-Test 21	3mm deflection (RMCPM04~RMCPM20) 2mm defelection (RMCPM22~RMCPM24)	0.5%, 1%: ±(0.5% + 0.05Ω) 5%: ±(1.0% + 0.1Ω) 0Ω : 50mΩ or less
Terminal Strength (SMD)	IEC 60115-1 4.32	Force of 1.02kg for 10±1 seconds Remarks: RMCPM04: 0.51kgs	±(0.5% + 0.05Ω) 0Ω : 50mΩ or less
Sulfuration Test	ASTM-B-809-95	360 hours, 105±2°C Unpowered	0.5%, 1%: ±(1.0% + 0.05Ω) 5%: ±(2.0% + 0.05Ω) 0Ω : 100mΩ or less

MARKING

5% Marking
Value = 10KΩ

RMCF06/RMCFP06 (0603)
RMCF10/RMCFP10 (0805)
RMCF18/RMCFP18 (1206)
RMCF20/RMCFP20 (1210)
RMCF26/RMCFP26 (1812)
RMCF22/RMCFP22 (2010)
RMCF24/RMCFP24 (2512)

1% Marking
Value = 10KΩ

RMCF10/RMCFP10 (0805)
RMCF18/RMCFP18 (1206)
RMCF20/RMCFP20 (1210)
RMCF26/RMCFP26 (1812)
RMCF22/RMCFP22 (2010)
RMCF24/RMCFP24 (2512)

1% Marking
Value = 12.4KΩ

RMCF06/RMCFP06 (0603)
EIA-96
Marking

No Marking

RMCF04/RMCFP04 (0402)

- 5% tolerance: 3 digits
  First two digits are significant figure,
  Third digit is number of zeros, Letter R is decimal point.
- 1% tolerance: 4 digits
  First three digits are significant figure,
  Fourth digit is number of zeros
  Letter R is decimal point.
- 0603 1% : EIA-96 marking
- 0402 no marking
- Standard packaging is 8mm tape reel per EIA481

EIA-96 MARKING

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

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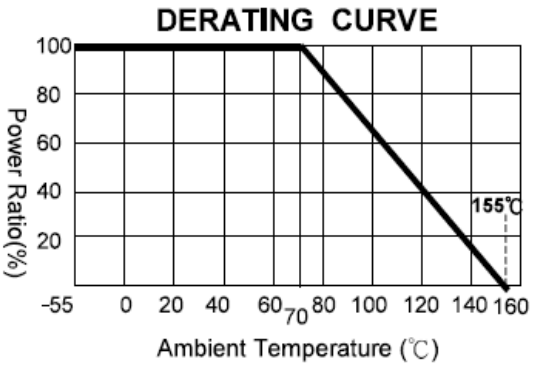
DERATING CURVE



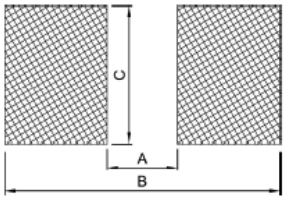
Power rating or current rating is in the case based on continuous full-load at ambient temperature of 70°C.
For operation at ambient temperature in excess of 70°C, the load should be derated in accordance with figure of derating curve.

* Rated Voltage
Resistance range: ≥1Ω
Rated Voltage: The resistor shall have a DC continuous working voltage of AC(ms) continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined by the following formula:

$$E(RCWV)=\sqrt{PxR}$$

E=Rated voltage(V)
P=Power rating(W)
R=Nominal resistance(Ω)

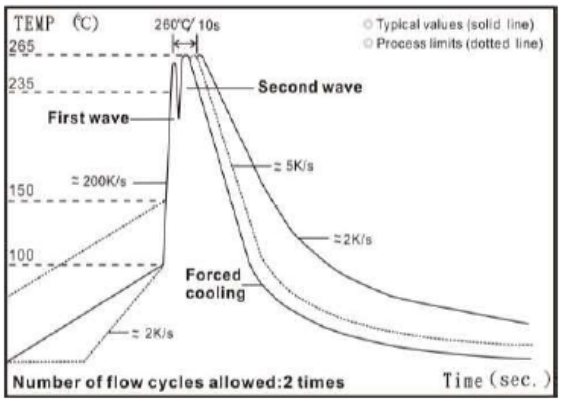
RECOMMENDED LAND PATTERN



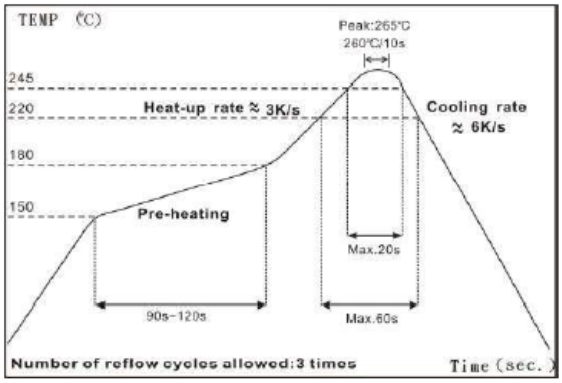
Type	a	b	c	Units
RMCF04/RMCFP04 (0402)	0.5	1.40	0.60	mm
RMCF06/RMCFP06 (0603)	0.95	2.10	0.90	mm
RMCF10/RMCFP10 (0805)	1.20	2.60	1.30	mm
RMCF18/RMCFP18 (1206)	2.00	3.80	1.60	mm
RMCF20/RMCFP20 (1210)	2.00	4.40	2.70	mm
RMCF26/ RMCFP26 (1812)	3.11	5.91	3.00	mm
RMCF22/RMCFP22 (2010)	3.80	6.68	2.70	mm
RMCF24/ RMCFP24 (2512)	4.90	8.10	3.40	mm

RECOMMENDED SOLDERING PARAMETERS

Wave Solder Temperature Condition



Solder Reflow Temperature Condition



- Rework temperature (hot air equipment): 350°C, 3~5 seconds
- Recommened reflow methods
  - IR, vapor phase over, hot air over
  - If reflow temperature exceed the recommended profile, devices may not meet the performance requirements.