



APPROVAL SHEET

of

RJ SERIES METAL FILM RESISTORS

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1. PRODUCT: METAL FILM RESISTORS PROFESSIONAL TYPE
2. PART NUMBER: Part number of the metal film resistor is identified by the name, power, tolerance, packing, temperature coefficient, and resistance value. Please use the part number when ordering to avoid misunderstanding and mistakes.

Example:

RJ	73	S	C	3	T	1004
Series Name	Power Rating	Size Code	Resistance Tolerance	Temperature Coefficient	Packing Type	Resistance Value

Style: RJ SERIES

(1) Power Rating: 73=1/4W; 74=1/2W; 16=1.0W; 17=2.0W; 18=3.0W;

(2) Size code: - normal size; S: small size; M: mini size;

MP: mini size power mode

(4) Tolerance: B=±0.1%; C=±0.25%; B=±0.50%; F=±1.0%; G=±2.0%; J=±5.0%;

(5) T.C.R.: 7=±5ppm/°C; 6=±10ppm/°C; 5=±15ppm/°C;

3=±25ppm/°C; 2 =±50ppm/°C; 1=±100ppm/°C; 0= no TCR test

(6) Packaging Type: B=BULK/BOX

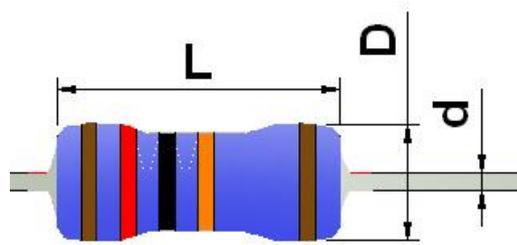
T=Tape on Box Packing

F/M=Deforming

(7) Resistance Value: 1R00、20R0、1000、1001、1002、3303、1004.....



3. BAND-CODE:



COLOR	1st	2nd	3rd	multiple	tolerance	TCR
black	0	0	0	1		
brown	1	1	1	10	F(±1.0%)	100ppm/°C
red	2	2	2	10 ²	G(±2.0%)	50ppm/°C
orange	3	3	3	10 ³		15ppm/°C
yellow	4	4	4	10 ⁴		25ppm/°C
green	5	5	5	10 ⁵	D(±0.50%)	15ppm/°C
blue	6	6	6	10 ⁶	C(±0.25%)	10ppm/°C
purple	7	7	7		B(±0.10%)	5ppm/°C
gray	8	8	8			
white	9	9	9			
golden				10 ⁻¹	J(±5.0%)	
silver				10 ⁻²	K(±10%)	

Five or six color code rings are designated in accordance with IEC 60062. Temperature coefficient marked for small TCR on request as the sixth ring in accordance with IEC 60062. Digital marking is available on request.



4. ELECTRICAL CHARACTERISTICS

Type	Rated dissipation at 70°C	Max. working voltage U_{max}	Max. short time overload voltage	Dielectric withstanding voltage	Resistance range Resistance tolerance (%) Temperature coefficient (ppm/°C)			
					B; C; D; F C7; C6; C5	B; C; D; F C3	C; D; F C2	F; J C1
RJ72	0.16W	200V	400V	300V	49Ω to 300kΩ	10Ω to 1M Ω	10Ω to 2M2Ω	1Ω to 10MΩ
RJ73S	0.25W	250V	500V	300V	49Ω to 300kΩ	10Ω to 1M Ω	10Ω to 2M2Ω	1Ω to 10MΩ
RJ73	0.25W	250V	500V	500V	19Ω to 1MΩ	10Ω to 2M5Ω	10Ω to 5MΩ	1Ω to 10MΩ
RJ74M	0.50W	200V	400V	300V			10Ω to 2M2Ω	1Ω to 10MΩ
RJ74MP	0.50W	250V	450V	300V			10Ω to 2M2Ω	1Ω to 10MΩ
RJ74S	0.60W	350V	700V	500V	19Ω to 1MΩ	10Ω to 5M5Ω	10Ω to 5MΩ	1Ω to 10MΩ
RJ74	0.50W	350V	700V	500V	10Ω to 1MΩ	10Ω to 2M5Ω	10Ω to 5MΩ	1Ω to 10MΩ
RJ16M	1.00W	350V	700V	500V			10Ω to 5MΩ	1Ω to 10MΩ
RJ16S	1.00W	400V	800V	500V	10Ω to 1MΩ	10Ω to 2M5Ω	10Ω to 5MΩ	1Ω to 10MΩ
RJ16	1.00W	500V	1000V	600V	10Ω to 1MΩ	10Ω to 2M5Ω	10Ω to 5MΩ	1Ω to 10MΩ
RJ17M	2.00W	500V	1000V	500V			10Ω to 5MΩ	1Ω to 10MΩ
RJ17S	2.00W	500V	1000V	600V	10Ω to 1MΩ	10Ω to 2M5Ω	10Ω to 5MΩ	1Ω to 10MΩ
RJ17	2.00W	500V	1000V	700V	10Ω to 1MΩ	10Ω to 2M5Ω	10Ω to 5MΩ	1Ω to 10MΩ
RJ18M	3.00W	600V	1200V	600V			10Ω to 5MΩ	1Ω to 10MΩ
RJ18S	3.00W	500V	1000V	700V	10Ω to 1MΩ	10Ω to 2M5Ω	10Ω to 5MΩ	1Ω to 10MΩ
RJ18	3.00W	600V	1200V	800V	10Ω to 1MΩ	10Ω to 2M5Ω	10Ω to 5MΩ	1Ω to 10MΩ
RJ19M	5.00W	500V	1000V	700V			10Ω to 5MΩ	1Ω to 10MΩ
RJ19S	5.00W	600V	1200V	800V	10Ω to 1MΩ	10Ω to 2M5Ω	10Ω to 5MΩ	1Ω to 10MΩ

Unless otherwise specified, all values are tested at the following condition:

Temperature: 21°C to 25°C;

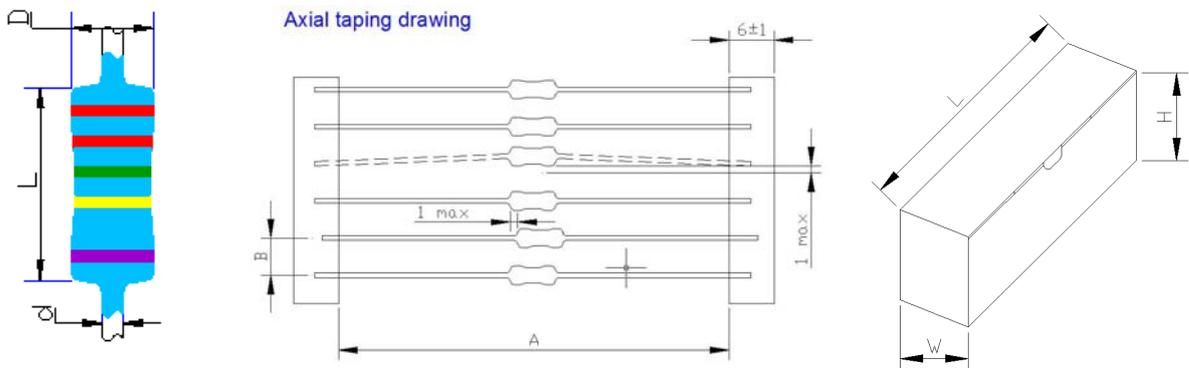
Relative humidity: 45% to 70%

*Resistance out of range is available on request.



5. Dimension and packing information

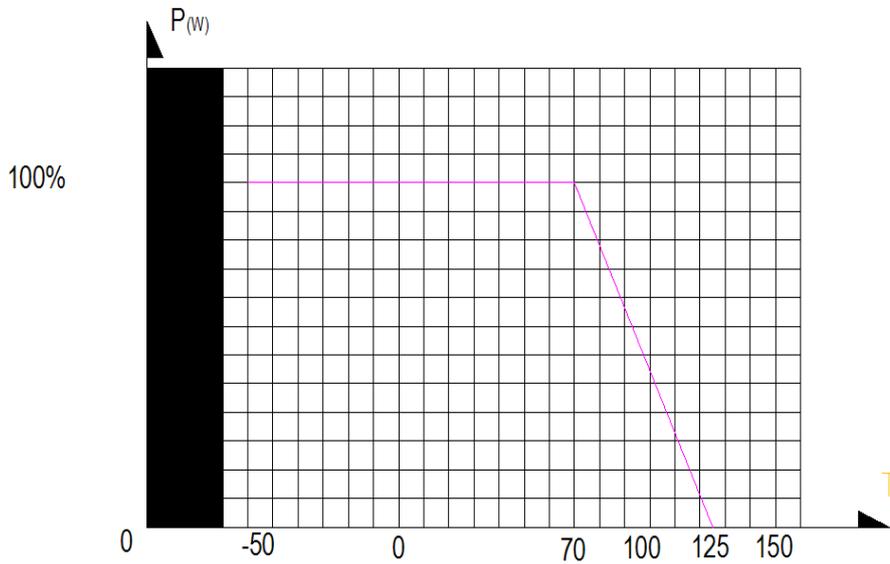
Type	L (mm)	D (mm)	d (mm)	Weight (mg)	TAPING		BOX (±10mm)			MPQ
					B (mm)	A (mm)	W (mm)	H (mm)	L (mm)	
RJ72	3.2±0.3	1.7±0.3	0.45±0.5	125	5.0±0.3	52±1.0	75	750	255	5000
RJ73S	3.2±0.3	1.7±0.3	0.45±0.5	140	5.0±0.3	52±1.0	75	750	255	5000
RJ73	5.9±0.5	2.3±0.3	0.60±0.5	240	5.0±0.3	52±1.0	75	1000	255	5000
RJ74M	3.2±0.3	1.5±0.3	0.45±0.5	150	5.0±0.3	52±1.0	75	750	255	5000
RJ74MP	3.2±0.3	1.5±0.3	0.45±0.5	150	5.0±0.3	52±1.0	75	750	255	5000
RJ74S	5.9±0.5	2.3±0.3	0.60±0.5	260	5.0±0.3	52±1.0	75	1000	255	5000
RJ74	9.0±1.0	3.3±0.5	0.60±0.5	470	5.0±0.3	52±1.0	75	1000	255	2500
RJ16M	5.9±0.5	2.3±0.3	0.60±0.5	280	5.0±0.3	52±1.0	75	1000	255	5000
RJ16S	9.0±1.0	3.3±0.5	0.60±0.5	500	5.0±0.3	52±1.0	75	1000	255	2500
RJ16	11±1.0	4.2±0.8	0.80±0.5	760	10±0.5	62±2.0	75	750	255	1000
RJ17M	9.0±1.0	3.3±0.5	0.70±0.5	550	5.0±0.3	52±1.0	75	1000	255	2500
RJ17S	11±1.0	4.2±0.8	0.80±0.5	800	10±0.5	62±2.0	75	750	255	1000
RJ17	15±1.0	5.5±1.0	0.80±0.5	1320	10±0.5	62±2.0	85	1000	255	1000
RJ18M	11±1.0	4.2±0.8	0.80±0.5	860	10±0.5	62±2.0	75	750	255	1000
RJ18S	15±1.0	5.5±1.0	0.80±0.5	1400	10±0.5	72±3.0	85	1000	255	1000
RJ18	25±1.0	9.0±1.0	0.80±0.5	4450	10±0.5	72±3.0	85	1000	255	500
RJ19M	15±1.0	5.5±1.0	0.80±0.5	1550	10±0.5	72±3.0	85	1000	255	1000
RJ19S	25±1.0	9.0±1.0	0.80±0.5	4600	10±0.5	72±3.0	85	1000	255	500



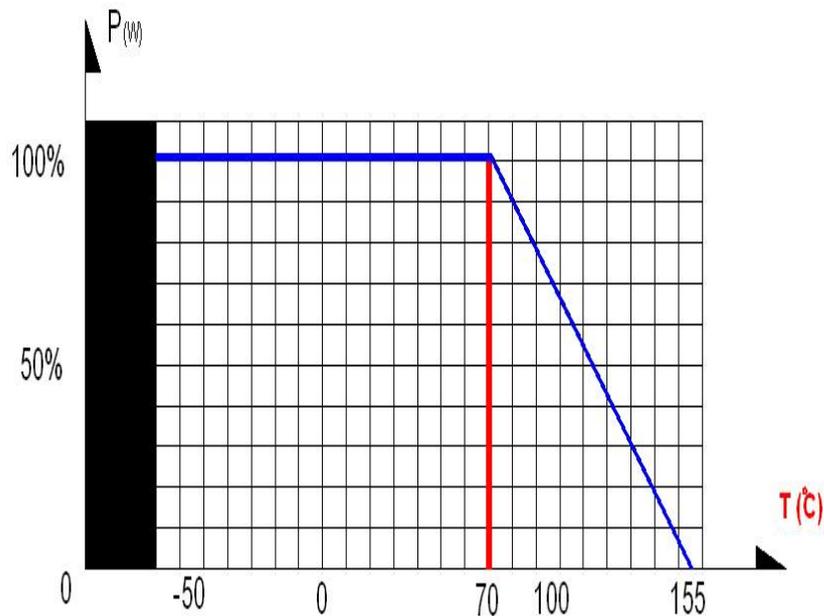
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 Website: www.thunder-resistor.com Email: sales@thunder-resistor.com



6. DERATING CURVE



1 Derating curve for normal size resistors



2 Derating curve for small size and mini size resistors

For resistors working at an ambience temperature of $70^{\circ}C$ or above, the power rating shall be derated in accordance with the above curves.



6. ENVIRONMENTAL CHARACTERISTICS

(1) Short Time Over Load Test

Load resistors at 2.5 times of the rated voltage or 2 times the maximum working voltage whichever is lower, applied for 5 seconds, the resistor should be free from defects in outlooks, unload the resistor for at least 30 minutes before test, the change of the resistance value should be within $\pm (0.10\%+0.05\Omega)$ for resistors with tight tolerance and within $\pm (0.25\%+0.05\Omega)$ for resistors with normal tolerance or small size and mini size as compared with the value before the load.

(2) Dielectric Withstanding Voltage

The resistor is placed on the metal V Block. Apply dielectric withstanding voltage between the terminals connected together and the block for about 60 seconds. The resistor shall be able to withstand without breakdown or flashover

(3) Temperature Coefficient Test

Test of resistors at room temperature and 60°C or 100°C on request above room temperature. Then measure the resistance. The Temperature Coefficient is calculated by the following equation and its value should be within the range requested.

$$\text{Resistor Temperature Coefficient} = \frac{R - R_0}{R_0} \times \frac{1}{t - t_0} \times 10^6$$

R = Resistance value under the testing temperature

R₀ = Resistance value at the room temperature

t = the 2nd testing temperature

t₀ = Room temperature

(4) Insulation Resistance

Apply test poles on resistor body and terminals of the resistor. The insulation resistance should be high than 10,000 M Ohm. The test voltage is 500V_{dc}.

(5) Solderability

Immerse the resistor into the solder pot at 230±5°C for 5±0.5 seconds. At least 95% solder coverage on the termination.



(6) Resistance to Solvent

Immerse the resistors into the appropriate solvent of Ethylene Chloride, washing with ultrasonic machine for 1 minute. No deterioration of coatings and color code occurred.

(7) Terminal Strength

Direct Load – Resistors shall be held by one terminal and the load shall be gradually applied in the direction of the longitudinal axis of the resistor unit, the applied load reached 5 pounds. The load shall be held for 10 seconds. No breaking occurred.

(8) Pulse Overload

Apply 4 times of rated voltage or 2 times the maximum working voltage whichever is lower to the resistor at the 1 second on and 25 seconds off cycle, subjected to voltage application cycles specified in 10000. The change of the resistance value shall be within $\pm (0.50\%+0.05\Omega)$ for resistors with tight tolerance or within $\pm (2.0\%+0.05\Omega)$ for resistors with normal tolerance and or small size and mini size.

(9) Load Life in Humidity

Place the resistor in a test chamber at $40\pm 2^\circ\text{C}$ and 90~95% relative humidity. Apply the rated voltage or the maximum working voltage whichever is lower to the resistor at the 1.5 hours on and 0.5 hour off cycle. The total length of test is 1000 hours. The change of the resistance value shall be within $\pm (0.50\%+0.05\Omega)$ for resistors with tight tolerance and within $\pm (1.0\%+0.05\Omega)$ for resistors with normal tolerance and or small size and mini size.

(10) Load Life Test

Placed the resistor in the constant temperature chamber of $70\pm 3^\circ\text{C}$, the resistor shall be connected to the lead wire at the point of 25mm Length with each terminal, the resistors shall be arranged not much effected mutually by the temperature of the resistors and the excessive ventilation shall not be performed, apply DC rated voltage or the maximum working voltage whichever is lower at 90 minutes on and 30 minutes off continuously for $1000+48/-0$ hours. Then left the resistors at no-load for 1hour, the change of the resistance value measured at this time to the value before the load shall be within $\pm(0.50\%+0.05\Omega)$ for resistors with tight tolerance and within $\pm(2.0\%+0.05\Omega)$ for resistors with normal tolerance or small size and mini size.



(11) Temperature Cycling Test

The temperature cycle shown in the following table shall be repeated 5 times consecutively. The measurement of the resistance value is done before the first cycle and after ending the fifth cycle, leaving in the room temperature for about 1 hour, the change shall be within $\pm (1\%+0.05\Omega)$. After the test the resistor shall be free from the electrical or mechanical damage. Temperature Cycling Conditions:

Step	Temperature(°C)	Time (minute)
1	+25+10/ -5	10 to15
2	-65+0/ -3	30
3	+25+10/ -5	10 to15
4	+150+3/ -0	30

(12) Resistance to soldering heat:

The terminal lead shall be dipped into the solder pot at $260\pm 10^\circ\text{C}$ for 3 ± 0.5 seconds up to 3 mm apart from the body of the resistor. The change of the resistance value shall be within $\pm(0.25\%+0.05\Omega)$

(13) Boiling test

Sample 80 pcs from each lot boiling in boiling water for 1hour, dry them in room temperature for 30 minutes and load them with rated DC voltage or maximum working voltage whichever is lower for this series for 1hour, repeat to boil and load for another 1cycle, dry them at least 30m before test. The change of the tolerance of the resistors shall be within $\pm(2.00\%+0.05\Omega)$.



Appendix: cross checking for Vishay's and KOA's parts.

Thunder's type	Vishay's type	KOA's type
RJ72		
RJ73S	SMA 0204	MFS1/4; SPRX1/4
RJ73		MF1/4; SPR1/4
RJ74M	MSR16	
RJ74MP	SMA0204	
RJ74S	MSR25; SMA 0207	MFS1/2; SPRX1/2
RJ74		MF1/2; SPR1/2
RJ16M	PR01; SMA0309	
RJ16S	SMA 0414	SPRX1
RJ16		MF1; SPR1
RJ17M	PR02	
RJ17S		SPRX2
RJ17		MF2; SPR2
RJ18M	PR03	
RJ18S		SPRX3
RJ18		SPR3
RJ19M		
RJ19S		SPRX5