ROYALOHM

SPECIFICATION FOR APPROVAL

TRELIK

Description : Metal Film Fixed Resistors

Royalohm Part no.: MF03SJJxxxxA19 (MF 3W-S +/- 5% 200ppm)

Approved by

Parts corresponding to RoHS Compliant: 2005-Apr.-1

Royal Electronic Factory (Thailand) Co., Ltd.
20/1-2 Moo 2 Klong-Na, Muang
Chachoengsao 24000, Thailand
Tel: +66-38-822404-8
Fax: +66 38-981190 / 823765
E-mail Address: Export sales: Export@royalohm.com
Local sales: Local@royalohm.com
http://www.royalohm.com
P.O. Box 251 Klongchan, Bangkok 10240, Thailand

Approved	Checked	Prepared
Mr. Jack Lin	Ms. S. Sakultala	Ms. I. Supakhinee

Issue Date: 2007/02/03

CHANGE NOTIFICATION HISTORY			
Version	**Date of Version**	**History**	**Remark**
1	2004/11/3	Resistance range: 10Ω----1MΩ	
2	2005/3/17	Change from JIS C 5202 to JIS C 5201-1	
3	2005/7/7	Lead wire diameter: 0.70 ± 0.05 (Unit: mm)	

Customer: TRELIK	Part No.: MF03SJJxxxxA19

1. Scope:

This specification for approval relates to Metal Film Fixed Resistors manufactured by ROYALOHM 's specifications.

2. Type designation:

The type designation shall be in the following form :

(Ex.)	MF	3W-S	J	1KΩ
	Type	Power Rating	Resistance Tolerance	Nominal Resistance

3. Ratings:

Ratings shall be shown in the table 1.

Table 1

Type	MF
Rated Power	3W at 70□
Max. Working Voltage	500 V
Max. Overload Voltage	1000 V
Dielectric Withstanding Voltage	1000 V
Rated Ambient Temp.	70 □
Operating Temp. Range	-55□ --- +155□
Resistance Tolerance	± 5%
Resistance Value	10Ω----1MΩ

3.1 Power rating:

Resistors shall have a power rating based on continuous full load operation at an ambient temperature of 70 □. For temperature in excess of 70 □ , the load shall be derated as shown in the figure 1.

3.2 Voltage rating:

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform curresponding to the power rating , as determined from the following formula :

$$RCWV = \sqrt{P \times R}$$

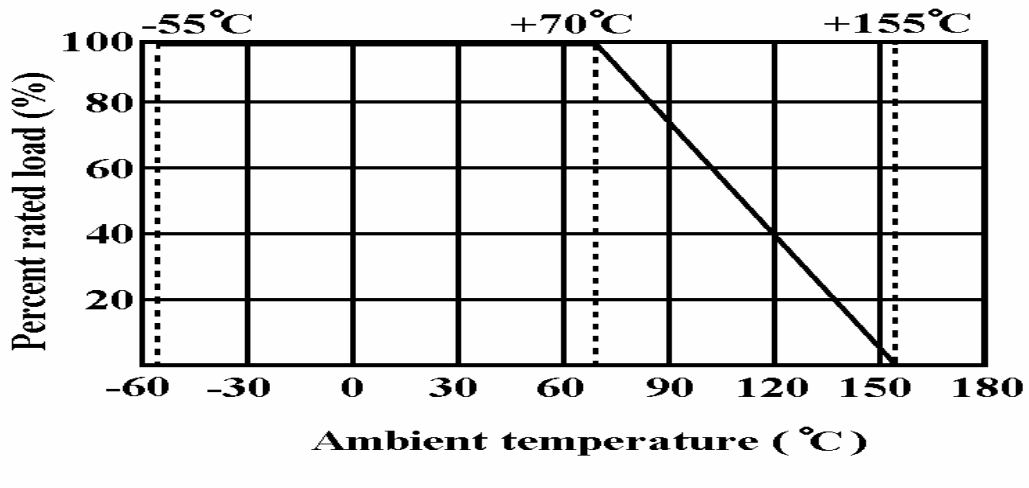
Were : RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt)

P = Power Rating (watt)

R = Nominal Resistance (ohm)

In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value

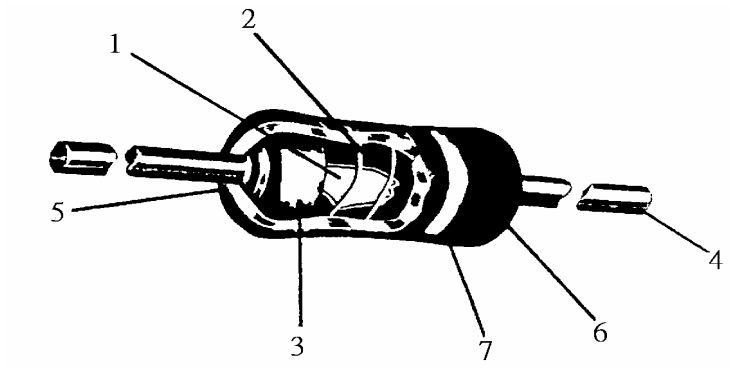
Figure 1.



3.3 Nominal resistance :

Effective figures of nominal resistance shall be in accordance with E-24 series, and resistance tolerance shall be shown by table 1.

4. Construction :



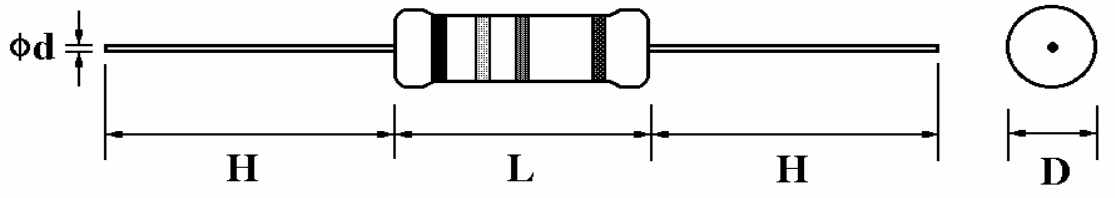
No.	Name	Material
1	Basic Body	Rod Type Ceramics
2	Resistance Film	Metal Film
3	End Cap	Steel (Tin plated iron surface)
4	Lead Wire	Annealed copper wire coated with tin
5	Joint	By Welding
6	Coating	Insulated resin (Color : Sky blue)
7	Color Code	Epoxy Resin

Metal Film Fixed Resistors		
5. Characteristics :		
Characteristics	Limits	Test Methods (JIS C 5201-1)
DC. Resistance	Must be within the specified tolerance	5.1 The limit of error of measuring apparatus shall not exceed allowable range or 5% of resistance tolerance
Temperature coefficient	Within the temperature coefficient specified below : ± 200 PPM/□ Max.	5.2 Natural resistance change per temp. degree centigrade $\frac{R_2-R_1}{R_1(t_2-t_1)} \times 10^6$ (PPM/□) R_1: Resistance value at room temperature (t1) R_2: Resistance value at room temp. plus 100 □ (t_2)
Short time overload	Resistance change rate is ± (0.5% + 0.05Ω) Max. with no evidence of mechanical damage	5.5 Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds
Dielectric withstanding voltage	No evidence of flashover mechanical damage, arcing or insulation break down	5.7 Resistors shall be clamped in the trough of a 90° metallic V-block and shall be tested at AC potential respectively specified in the table 1. for 60 + 10/ -0 seconds
Pulse overload	Resistance change rate is ± (1% + 0.05Ω) Max. with no evidence of mechanical damage	5.8 Resistance change after 10,000 cycles (1 sec. "on" , 25 secs. "off") at 4 times RCWV
Terminal strength	No evidence of mechanical damage	6.1 **Direct load** : Resistance to a 2.5 kgs direct load for 10 secs. in the direction of the longitudinal axis of the terminal leads **Twist test :** Terminal leads shall be bent through 90 ° at a point of about 6mm from the body of the resistor and shall be rotated through 360° about the original axis of the bent terminal in alternating direction for a total of 3 rotations
Resistance to soldering heat	Resistance change rate is ± (1% + 0.05Ω) Max. with no evidence of mechanical damage	6.4 Permanent resistance change when leads immersed to 3.2 to 4.8 mm from the body in 350□ ± 10 □ solder for 3 ± 0.5 seconds

Metal Film Fixed Resistors

<table>
<tr><th>Characteristics</th><th>Limits</th><th>Test Methods
(JIS C 5201-1)</th></tr>
<tr><td>Solderability</td><td>95 % coverage Min.</td><td>6.5 The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes.
Test temp. of solder : 245□ ± 3□
Dwell time in solder : 2 ~ 3 seconds</td></tr>
<tr><td>Resistance to solvent</td><td>No deterioration of protective coatings and markings</td><td>6.9 Specimens shall be immersed in bath of trichroethane completely for 3 mins. with ultrasonic</td></tr>
<tr><td>Temperature cycling</td><td>Resistance change rate is ± (1% + 0.05Ω) Max. with no evidence of mechanical damage</td><td>7.4 Resistance change after continuous 5 cycles for duty shown below:
<table>
<tr><th>Step</th><th>Temperature</th><th>Time</th></tr>
<tr><td>1</td><td>-55□ ± 3□</td><td>30 mins</td></tr>
<tr><td>2</td><td>Room temp.</td><td>10□15 mins</td></tr>
<tr><td>3</td><td>+155□ ± 2□</td><td>30 mins</td></tr>
<tr><td>4</td><td>Room temp.</td><td>10□15 mins</td></tr>
</table></td></tr>
<tr><td>Load life in humidity</td><td><table>
<tr><th>Resistance value</th><th>□ R/R</th></tr>
<tr><td>Normal type</td><td>± 1.5 %</td></tr>
</table></td><td>7.9 Resistance change after 1,000 hours (1.5 hours "on", 0.5 hour "off") at RCWV in a humidity test chamber controlled at 40 □ ± 2 □ and 90 to 95 % relative humidity</td></tr>
<tr><td>Load life</td><td><table>
<tr><th>Resistance value</th><th>□ R/R</th></tr>
<tr><td>Normal type</td><td>± 1.5 %</td></tr>
</table></td><td>7.10 Permanent resistance change after 1,000 hours operating at RCWV with duty cycle of (1.5 hours "on", 0.5 hour "off") at 70□ ± 2□ ambient</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

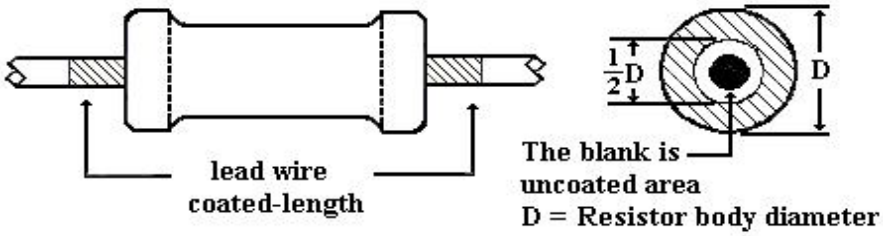
6. Dimension : Unit :mm



Type	Power Rating	D (Max.)	L (Max.)	d ± 0.05	H ± 3
MF	3W-S	5.0 mm	16.0 mm	0.70 mm	28 mm

Painting method:

Welding point, terminal and lead wire, is permissible to be exposed without the outer coated cover. The extent should be within 1/2 of the are angle.

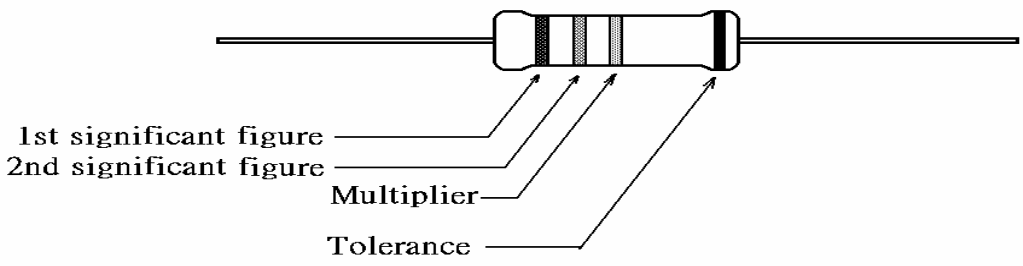


7. Marking :

7.1 Resistor :

Resistors shall be marked with color coding

colors shall be in accordance with JIS C 0802



7.2 Label :

Label shall be marked with following items:

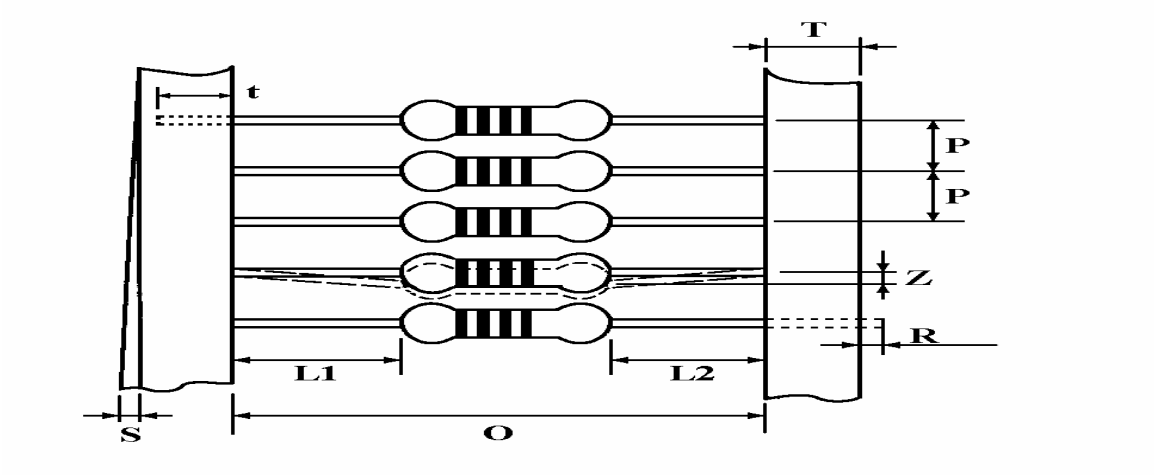
(1) Type and style
(2) Nominal resistance
(3) Resistance tolerance
(4) Quantity
(5) Lot number
(6) PPM

Example :

Metal Film Fixed Resistors			
Watt :	3W-S	Val :	10K
Q'TY :	1,000	Tol :	5%
Lot :	813478	PPM :	200
	ROYALOHM		Pb Free

8. Packing specification :

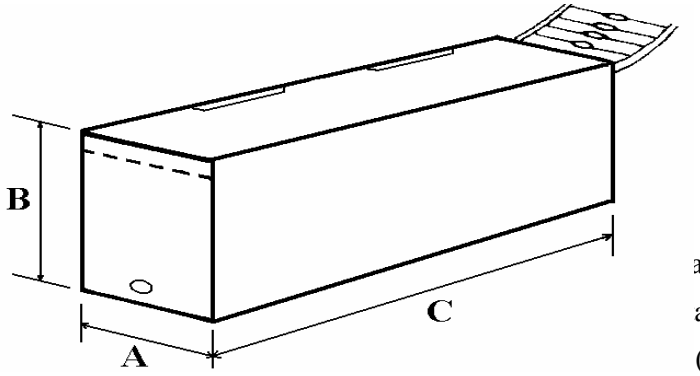
8.1 Taping dimension :



Dimensions (mm)

Type	Style	O	P	L_1-L_2	T	Z	R	t	S
MF-300s	PT-64	64 ± 1	10 ± 0.5	1 Max.	6 ± 1	1 Max.	0	5 ± 1	0.5 Max.

8.2 Tape in box packing :



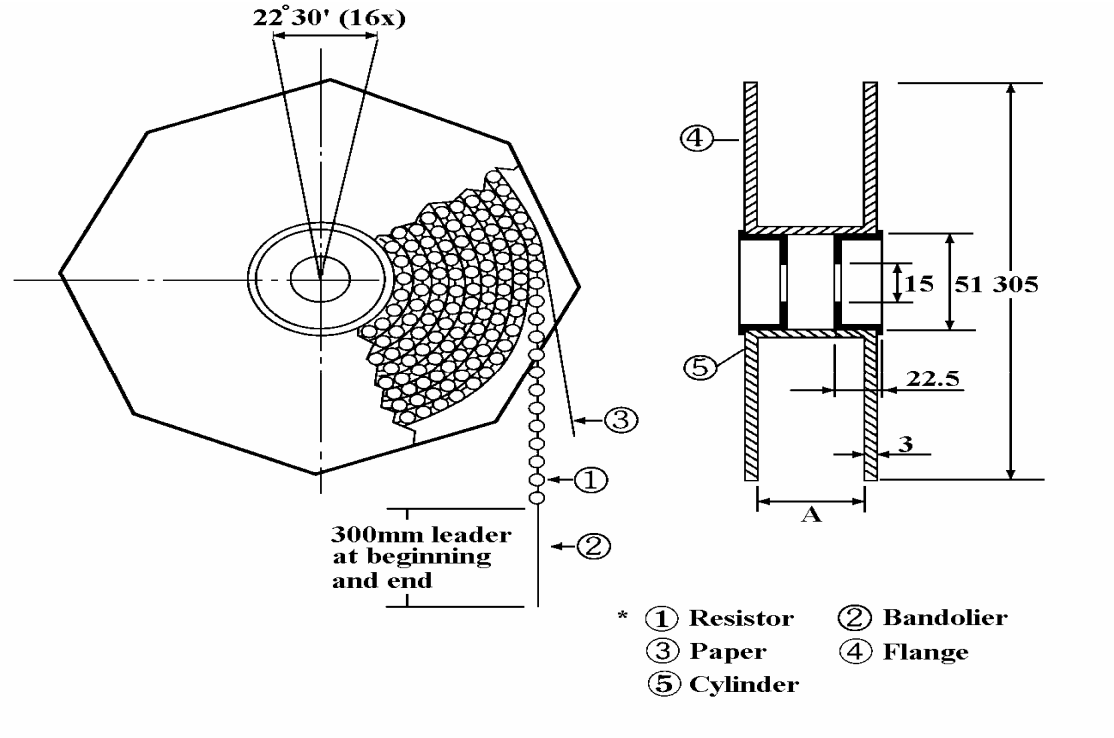
andoliers may also be
ained in a cardboard
("Ammopack")

Dimension (mm)

Type	Style	L (C) ± 5	W (A) ± 5	H (B) ± 5	Quantity Per Box (pcs.)
MF-300s	PT-64	260	94	87	1,000

"Ammopack" is an abbreviation of "ammunition pack"

8.3 Tape on reel packing :



Dimension (mm) :

Type	Style	Across Flange (A)	Quantity Per Reel
MF-300s	PT-64	81 ± 5	1,000 pcs.

Part Number System

Explanation of Part Number System
(Metal Film Fixed Resistors)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
M	F	0	3	S	J	J	0	1	0	3	A	1	9

Product Type:
MF = Metal Film
Fixed Resistor

Special Feature:
0 = Standard Product
F = Non-Flame
I = Non-Inductive Product

Wattage:

Normal size:
W8 = 1/8W
W4 = 1/4W
W2 = 1/2W
1W = 1W
2W = 2W
3W = 3W

Small size:
S4 = 1/4W-S
S2 = 1/2W-S
06 = 0.6W-S
2S = 2W-S

Extra Small size:
U2 = 1/2W-SS
04 = 0.4W-SS

Tolerance:
B = ± 0.1%
C = ± 0.25%
D = ± 0.5%
F = ± 1%
G = ± 2%
J = ± 5%

PPM requirement:
B = ± 15PPM
C = ± 25PPM
D = ± 50PPM
F = ± 50PPM
G = ± 100PPM
J = ± 200PPM

Resistance Value:
E-24 series: the 1st digit is"0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the number of zeros following:
"J" ~ 0.1, "K" ~ 0.01
Ex.: 4.7Ω ~ 47J, 4.7KΩ ~ 472
E--96 Series: the 1st to 3rd digits are significant figures of resistance and the fourth one denotes number of zeros following:
Ex.: 1.33KΩ = 1331

Packing Quantity:
1 = 1,000pcs
2 = 2,000pcs
3 = 3,000pcs
4 = 4,000pcs
5 = 5,000pcs
A = 500pcs
B = 2,500pcs
C = 10,000pcs
D = 20,000pcs
0 = for Bulk/Box packing

Packing Type:
A = Tape/Box
T = Tape/Reel
B = Bulk/Box
P = Tape/Box of PT-26mm

Addition Information:
0 = PT-52mm, NIL for PT-26mm
8 = PT-58mm
9 = PT-64mm

Sample: MF 3W-S +/- 5% 200ppm 10KΩ T/B 1,000 → MF03SJJ0103A19