

Approval Sheet

for

Metal Film Resistors Power Flame-Proof Type FMP series

$\pm 1 \%$ & $\pm 5 \%$

YAGEO CORPORATION

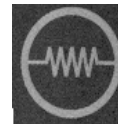
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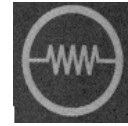
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Rev.	Description	Issue Date	Drawn	Approved
00	issue new spec.	Jul 16, 2007	Sara Lin	Joyce Chung
01	Add new type	Dec 20, 2007	Lynn Chen	Joyce Chung
02	FMP4WV is included	Dec 10, 2008	Lynn Chen	Joyce Chung
03	Add special forming type	Feb 03, 2009	Lynn Chen	Ken Hsu

Description	Metal Film Resistors, Power Flame-Proof Type		
Series	FMP	Rev.	03

**1. PRODUCT:**

POWER FLAME-PROOF TYPE METAL FILM RESISTORS

2. PART NUMBER:

Part number of the power flame-proof type metal film resistor is identified by the name, power, tolerance, packing, temperature coefficient, special type and resistance value.

Example :

FMP	-50	F	T	E	52-	100R
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Series Name	Power Rating	Resistance Tolerance	Packing Style	Temperature Coefficient of Resistance	Special Type	Resistance Value

(1) Style: FMP SERIES

(2) Power Rating : -50 = 1/2W 、 100 = 1W 、 200 = 2W 、 300 = 3W 、 400 = 4W

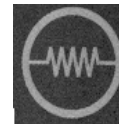
(3) Tolerance : F=±1% J=±5%

(4) Packaging Type: R=Paper Taping Reel
T=Tape on Box Packing
B=Bulk Packing

(5) Temperature Coefficient : F = ± 100PPM

(6) Special Type : 52- = 52.4mm
73- = 73mm
M = M Type Forming for Bulk
F = F Type Forming for Bulk
FK = FK Type Forming
FFK = FFK Type Forming
FKK = FKK Type Forming
FT = FT Type Forming
MT = MTsert
PN = PANAsert
AV = AVIsert(7) Resistance Value : ±1% for E24 & E96 Series
±5% for E24 Series

Example : 1R 、 10R 、 100R 、 10K 、 100K 、 1M.....



3. BAND-CODE:



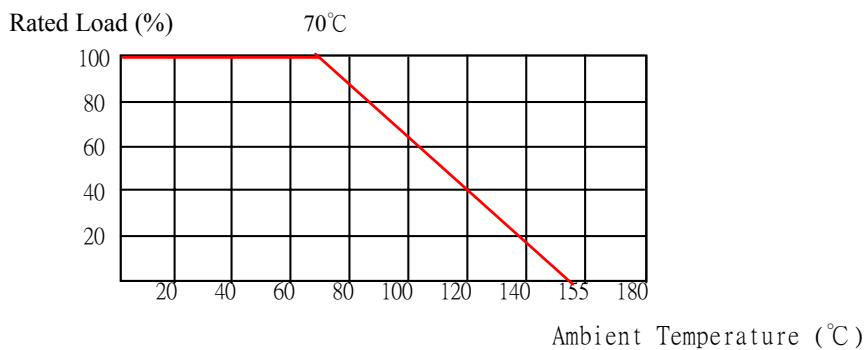
COLOR	1ST BAND	2ND BAND	3ND BAND	MULTIPLIER	TOLERANCE
BLACK	0	0	0	1Ω	
BROWN	1	1	1	10Ω	± 1 % (F)
RED	2	2	2	100Ω	
ORANGE	3	3	3	1KΩ	
YELLOW	4	4	4	10KΩ	
GREEN	5	5	5	100K	
BLUE	6	6	6	1MΩ	
VIOLET	7	7	7	10MΩ	
GREY	8	8	8		
WHITE	9	9	9		
GOLD				0.1Ω	± 5 % (J)
SILVER				0.01Ω	

4. ELECTRICAL CHARACTERISTICS

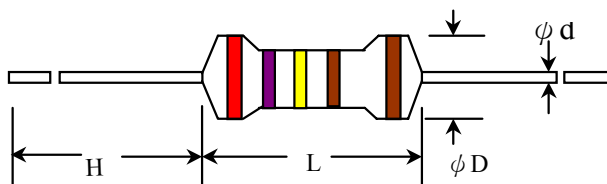
STYLE	FMP-50	FMP100	FMP200	FMP3WS	FMP300	FMP4WV
Power Rating at 70 °C	1/2W	1W	2W	3W	3W	4W
Maximum Working Voltage	200V	350V	500V		750V	
Maximum Overload Voltage	400V	600V	700V		1000V	
Dielectric Withstanding Voltage	300V	500V			750V	
Resistance Range	1Ω ~ 10MΩ & 0Ω for E24 & E96 series value					
Operating Temp. Range	- 55 °C to + 155 °C					
Temperature Coefficient	±100 ppm /°C					

* Below or over this resistance on request.

5. DERATING CURVE



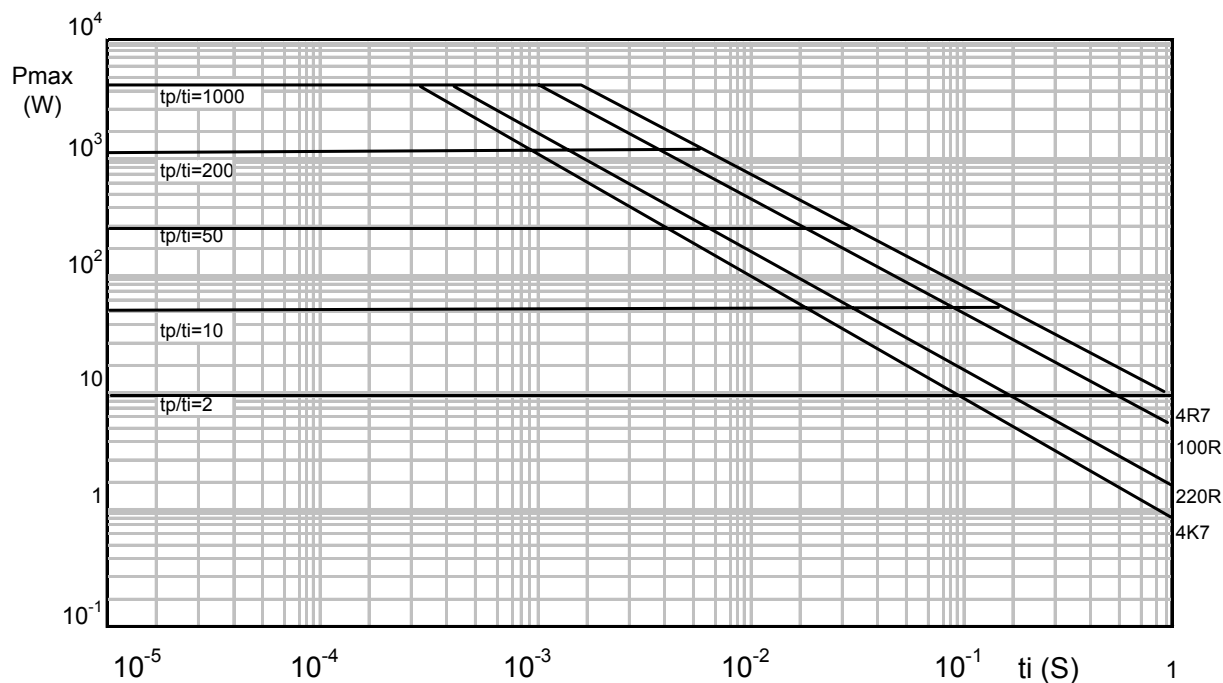
6. DIMENSIONS



Unit : mm

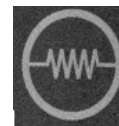
STYLE	L	ϕD	H	ϕd
FMP-50	3.4±0.3	1.9±0.2	28±2.0	0.45±0.05
FMP100	6.3±0.5	2.4±0.2	28±2.0	0.55±0.05
FMP200	9.0±0.5	3.9±0.3	26±2.0	0.55±0.05
FMP3WS	11.5±1.0	4.5±0.5	33±2.0	0.8±0.05
FMP300	15.5±1.0	5.0±0.5	33±2.0	0.8±0.05
FMP4WV	17.0±1.0	7.5±0.5	32±2.0	0.8±0.05

7. PULSE LOADING CAPABILITIES



FMP4WV Series:

Pulse on a regular basis; maximum permissible peak pulse power (P_{max}) as a function of pulse duration (t_i).



8. ENVIRONMENTAL CHARACTERISTICS

(1) Short Time Over Load Test

At 2.5 times of the rated voltage. (If the voltage exceeds the maximum load voltage, the maximum load voltage will be used as the rated voltage) applied for 5 seconds, the resistor should be free from defects after the resistor is released from load for about 30 minutes

$$\text{Short Time Overload Voltage} = 2.5 * \sqrt{\text{Power Rating} \times \text{Resistance Value}}$$

The change of the resistance value should be within $\pm 0.5 \% + 0.05 \Omega$

(2) Dielectric Withstanding Voltage

The resistor is placed on the metal V Block. Apply a Table I dielectric withstanding between the terminals connected together with the block for about 60 seconds.

The resistor shall be able to withstand without breakdown or flashover.

(3) Temperature Coefficient Test

Test of resistors above room temperature $100^{\circ}\text{C} \pm 2^{\circ}\text{C}$ (Testing Temperature 115°C to 130°C) at the constant temperature silicon plate for over 5 minutes. Then measure the resistance value.

The Temperature Coefficient is calculated by the following equation and its value should be within the range of 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 testing temperature

t₀ = Room temperature

(4) Insulation Resistance

Apply test terminal on lead and resistor body.

The test resistance should be high than 1,000M ohm.

(5) Solderability

Immerse the specimen into the solder pot at $260 \pm 5^{\circ}\text{C}$ for 5 ± 0.5 seconds.

At least 95% solder coverage on the termination.

(6) Resistance to Solvent

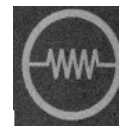
The specimen into the appropriate solvent of IPA condition of ultrasonic machine for 1 minutes.

The specimen is no deterioration of coatings and color code.

(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 reacheds 5 pounds °

The load shall be held for 10 seconds. The load of weight shall be $\geq 2.5 \text{ kg}$ (24.5N).



(8) Pulse Overload

Apply 4 times of rated voltage to the specimen at the 1 second on and 25 seconds off cycle, subjected to voltage application cycles specified in 10,000 time ◦

The change of the resistance value shall be within $\pm 1.0\% + 0.05 \Omega$

(9) Load Life in Humidity

Place the specimen in a test chamber at $40 \pm 2 \text{ }^\circ\text{C}$ and 90 ~ 95 % relative humidity. Apply the rated voltage to the specimen at the 1.5 hours on and 0.5 hour off cycle. The total length of test is 1,000 hours
The change of the resistance value shall be within $\pm 2.0 \% + 0.05 \Omega$

(10) Load Life Test

Placed in the constant temperature chamber of $70 \pm 3 \text{ }^\circ\text{C}$ 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, for 90 minutes on and 30 minutes off under this condition the rated D.C. voltage is applied continuously for 1000+48/-0 hours then left at no-load for 1hour, measured at this time the resistance value ◦

The change of the resistance value shall be within $\pm 2.0 \% + 0.05 \Omega$.

There shall be no remarkable change in the appearance and the color code shall be legible after the test.

(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 ◦

Temperature Cycling Conditions:

Step	Temperature($^\circ\text{C}$)	Time (minute)
1	-55 ± 3	30
2	25 ± 3	2 ~ 3
3	155 ± 3	30
4	25 ± 3	2 ~ 3

The change of the resistance value shall be within $\pm 1.0 \% + 0.05 \Omega$

After the test the resistor shall be free from the electrical or mechanical damage.

(12) Resistance to Soldering Heat

The terminal lead shall be dipped into the solder pot at $350 \pm 10 \text{ }^\circ\text{C}$ for 3 ± 0.5 seconds up to 2 ~ 2.5 mm.

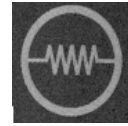
The change of the resistance value shall be within $\pm 0.25 \% + 0.05 \Omega$

(13) Overload Flame Retardant

At 4 times of the rated voltage. (If the voltage exceeds the maximum load voltage, the maximum load voltage will be used as the rated voltage) applied for 1 minute

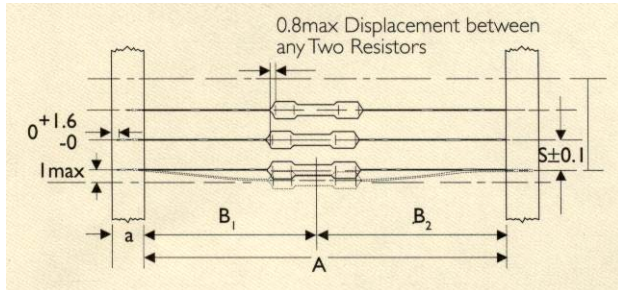
$$\text{Overload Test Voltage} = 4 * \sqrt{\text{Power Rating} \times \text{Resistance Value}}$$

The resistor shall be able to no evidence of flaming arcing.



9. PACKING METHODS

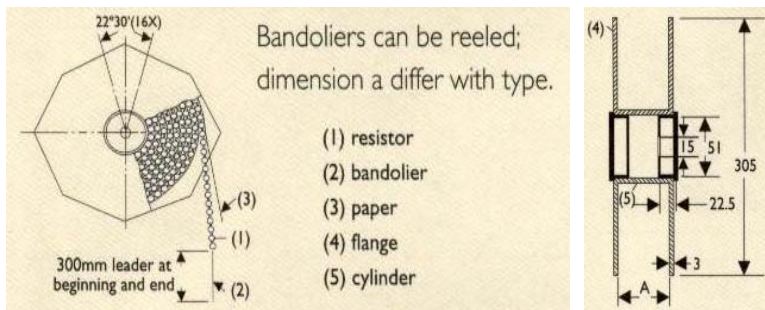
Bandolier for Axial leads



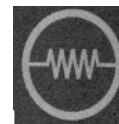
Unit : mm

STYLE	a	A	B1-B2	S (spacing)	T (max. deviation of spacing)
FMP-50	6 ± 0.5	52.4 ± 1.0	1.2	5	
FMP100	6 ± 0.5	52.4 ± 1.0	1.2	5	0.5 mm per 5 spacing
FMP200	6 ± 0.5	52.4 ± 1.0	1.2	5	1 mm per 10 spacing
FMP300	6 ± 0.5	73.0 ± 1.0	1.5	10	
FMP4WV	6 ± 0.5	73.0 ± 1.0	1.5	10	

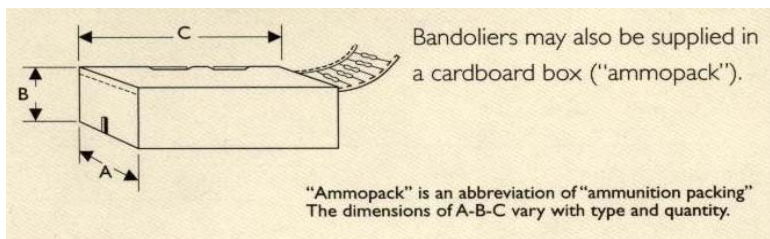
10. TAPE ON REEL PACKING



STYLE	ACROSS FLANGE (A)	Qty per reel
FMP-50	72	5,000
FMP100	72	5,000
FMP200	72	2,500
FMP300	95	2,000



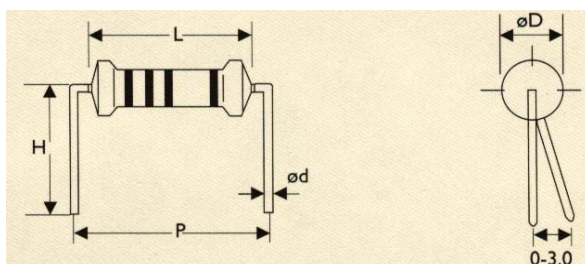
11. TAPE ON BOX PACKING



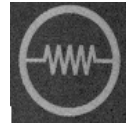
STYLE	Standard Lead Length			Qty per box
	W (A)	H (B)	L (C)	
FMP-50	81	70	260	5,000
FMP100	81	104	260	5,000
FMP200	73	45	258	1,000
FMP300	103	78	260	1,000
FMP4WV	103	78	260	1,000

12. SPECIAL TYPE (FORMING DIMENSIONS)

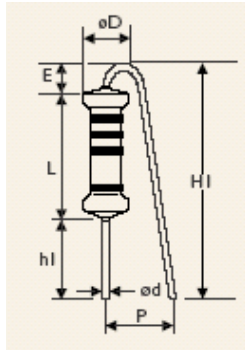
M TYPE



STYLE	DIMENSIONS				UNIT : mm
	L	ϕD	ϕd	P	H
Normal					
FMP-50	3.4 ± 0.3	1.9 ± 0.2	0.45 ± 0.05	6.0 ± 1.0	10.0 ± 1
FMP100	6.3 ± 0.5	2.4 ± 0.2	0.55 ± 0.05	10.0 ± 1.0	10.0 ± 1
FMP300	15.5 ± 1.0	5.0 ± 0.5	0.8 ± 0.05	20.0 ± 1.0	15.0 ± 1



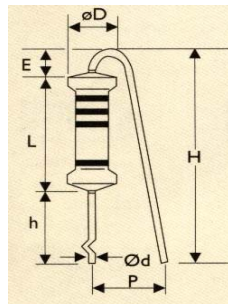
F TYPE



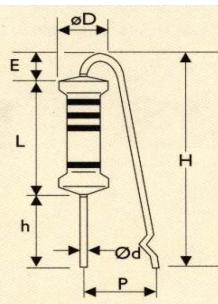
STYLE	DIMENSIONS							UNIT : mm
Normal	L	ϕD	ϕd	P	h1	H1 max	E max	
FMP300	15.5 ± 1.0	5.0 ± 0.5	0.8 ± 0.05	6.0 ± 1	5.0 ± 1	25	3.5	

* FMP100 is available

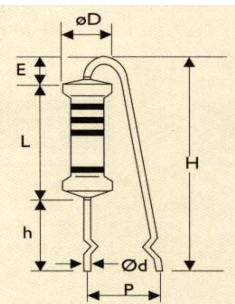
FK TYPE



FFK TYPE



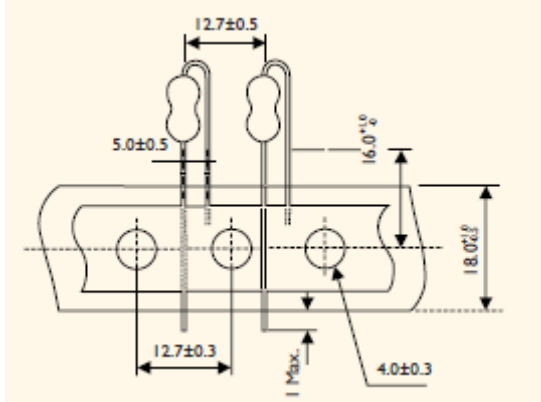
FKK TYPE



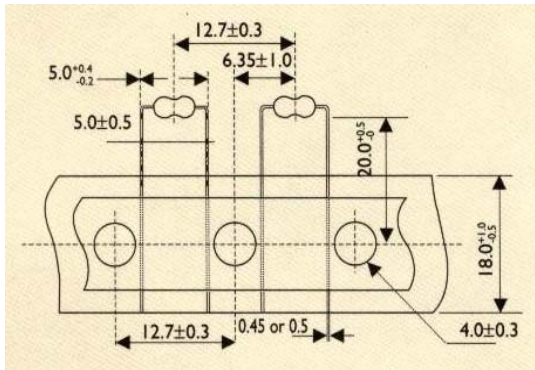
STYLE	DIMENSIONS							UNIT : mm
Normal	L	ϕD	ϕd	P	h	H max	E max	
FMP300	15.5 ± 1.0	5.0 ± 0.5	0.8 ± 0.05	6.0 ± 1	10.0 ± 1	30	3.5	

* FMP100 is available

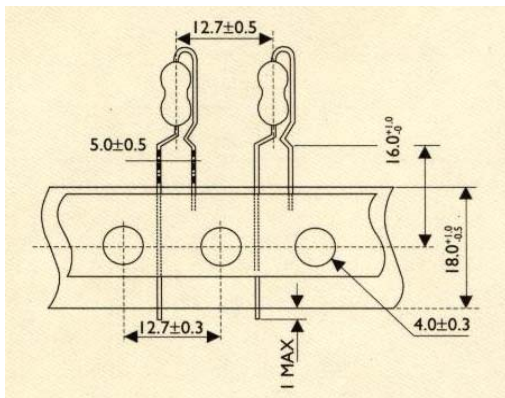
FT Type Forming for Taping (Rated Watt 100 size only)



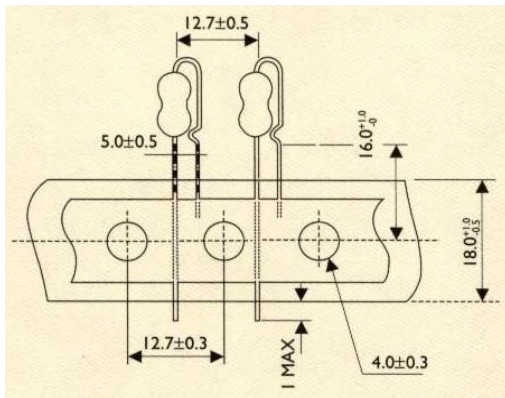
MT Type Forming for Taping (Rated Watt -50 size only)

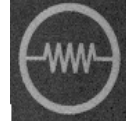


PN Type Forming for Taping (Rated Watt 100 size only)



AV Type Forming for Taping (Rated Watt 100 size only)





13. Plant Address

- A. Taiwan Xindian Plant
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- C. China Suzhou Plant
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