

DATA SHEET

METAL FILM RESISTORS

High Power, Flameproof
FMP Series

$\pm 1\%$, $\pm 5\%$

1/2W to 3W

RoHS compliant & Halogen Free



YAGEO

Product specification – May 14, 2024 V.6





APPLICATIONS

- All general purpose applications
- Power applications

FEATURES

- Ultra miniature size
- Wide resistance range
- High power rating
- High stability
- PPAP ready (FMP-50)
- Flameproof coating equivalent to UL94V-0
- RoHS compliant & halogen-free

ORDERING INFORMATION

Part number of the high power, flameproof metal film resistor are identified by the series, power rating, tolerance, packing, temperature coefficient, forming and resistance value.

PART NUMBER

<u>FMP</u> (1)	<u>200</u> (2)	<u>F</u> (3)	<u>I</u> (4)	<u>F</u> (5)	<u>52-</u> (6)	<u>100R</u> (7)
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(1) SERIES

FMP Series

(2) POWER RATING

-50 = 1/2W

100 = 1W

200 = 2W

3WS = 3W

300 = 3W

(3) TOLERANCE

F = $\pm 1\%$

J = $\pm 5\%$

(4) PACKAGING

R = Reel Pack

T = Box Pack

B = Bulk

(5) TEMPERATURE COEFFICIENT OF RESISTANCE

E = $\pm 50\text{ppm}/^\circ\text{C}$

F = $\pm 100\text{ppm}/^\circ\text{C}$

- = Based on spec.

(6) FORMING

26- = 26mm

52- = 52.4mm

73- = 73mm

52E = 52.4mm, $\Phi d = 0.70 \pm 0.05\text{mm}$

52J = 52.4mm, $\Phi d = 0.8 \pm 0.05\text{mm}$

52G = 52.4mm, $\Phi d \geq 0.6\text{mm}$

M = M Type Forming

F = F Type Forming

FK = FK Type Forming

FFK = FFK Type Forming

FKK = FKK Type Forming

FT = FT Type Forming

MT = MTsert

PN = PANAsert

AV = AVIsert

Note: 26mm, 52.4mm and 73mm represent dimension A of the axial type, please refer to the category of AXIAL/REEL TAPE SPECIFICATION for the detail.

(7) RESISTANCE VALUE

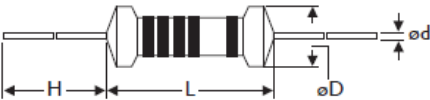
E24 & E96 Series

Example:

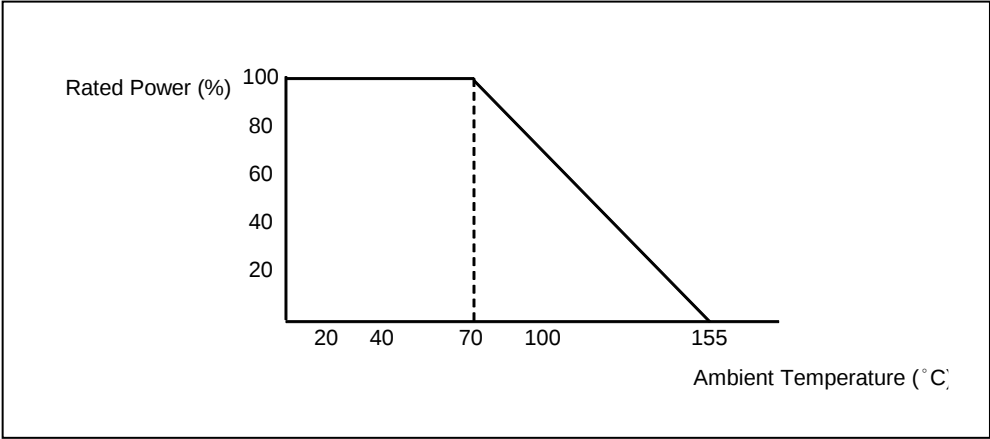
100R = 100 Ω , 10K = 10,000 Ω , 1M = 1,000,000 Ω

DIMENSIONS

Unit: mm

	Ultra Miniature	L	ψD	H	ψd
	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	35 ± 2.0	0.8±0.05
	FMP300	15.5± 1.0	5.0 ± 0.5	33 ± 2.0	0.8±0.05

DERATING CURVE



ELECTRICAL CHARACTERISTICS

CHARACTERISTICS	FMP-50	FMP100	FMP200	FMP3WS	FMP300
Power Rating at 70 °C	1/2W	1W	2W	3W	3W
Maximum Working Voltage	200V	350V	500V	500V	750V
Maximum Overload Voltage	400V	600V	700V	700V	1000V
Voltage Proof on Insulation	300V	500V	500V	500V	500V
Resistance Range	1Ω ~ 4M7Ω for E24 & E96 series value				
Operating Temp. Range	- 55°C to +155°C				
Temperature Coefficient	±100ppm/°C , ±50ppm/°C(FMP-50 & FMP100 types, R ≥ 10RΩ)				

Note: For resistance value out of above range is by request.

TEST AND REQUIREMENTS

TEST	TEST METHOD	PROCEDURE	APPRAISE
Short Time Overload	IEC 60115-1 4.13	2.5 times RCWV for 5 sec.(Not more than maximum overload voltage)	$\pm 1.0\% + 0.05\Omega$
Voltage Proof on Insulation	IEC 60115-1 4.7	In V-Block for 60 sec. test voltage as above table	No Breakdown
Temperature Coefficient	IEC 60115-1 4.8	Between -55°C to +155°C	By Type
Insulation Resistance	IEC 60115-1 4.6	In V-Block for 60 sec.	>1,000M Ω
Solderability	IEC 60115-1 4.17	245 $\pm$ 5°C for 3 $\pm$ 0.5 Sec.	95% Min. coverage
Solvent Resistance of Marking	IEC 60115-1 4.30	IPA for 5 $\pm$ 0.5 Min. with ultrasonic	No deterioration of coatings and markings
Robustness of Terminations	IEC 60115-1 4.16	Direct load for 10 Sec. in the direction of the terminal leads	$\geq 2.5\text{Kg}(24.5\text{N})$
Periodic-pulse Overload	IEC 60115-1 4.39	4 times RCWV(or Umax., whichever less) 10,000 cycles (1 Sec. on, 25 Sec.off)	$\pm 1.0\% + 0.05\Omega$
Damp Heat Steady State	IEC 60115-1 4.24	40 $\pm$ 2°C, 90-95% RH for 56 days, loaded with 0.1 times RCWV(or Umax., whichever less)	$\pm 2.0\% + 0.05\Omega$
Endurance at 70°C	IEC 60115-1 4.25	70 $\pm$ 2°C at RCWV(or Umax., whichever less) for 1,000 Hr.(1.5 Hr.on, 0.5 Hr. off)	$\pm 2.0\% + 0.05\Omega$
Temperature Cycling	IEC 60115-1 4.19	-55°C → Room Temp. → +155°C → Room Temp.(5 cycles)	$\pm 1.0\% + 0.05\Omega$
Resistance to Soldering Heat	IEC 60115-1 4.18	260 $\pm$ 3°C for 10 $\pm$ 1 Sec., immersed to a point 3 $\pm$ 0.5mm from the body	$\pm 0.25\% + 0.05\Omega$
Accidental Overload Test	IEC 60115-1 4.26	4 times RCWV(or Umax., whichever less) for 1 Min.	No evidence of flaming or arcing

Note:

RCWV (Rated Continuous Working Voltage):

The DC or AC (rms) continuous working voltage corresponding to the rated power is determined by the following formula:

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

or max. working voltage whichever is less

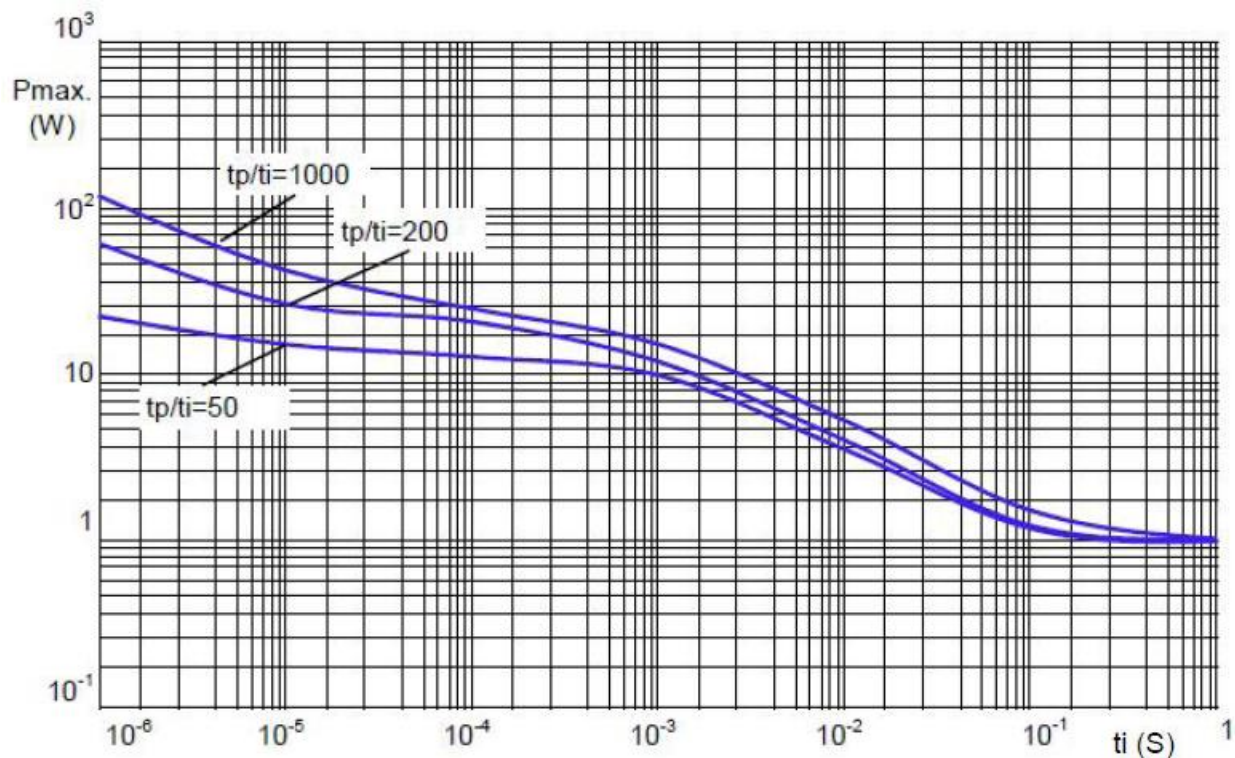
Where

V=Continuous rated DC or

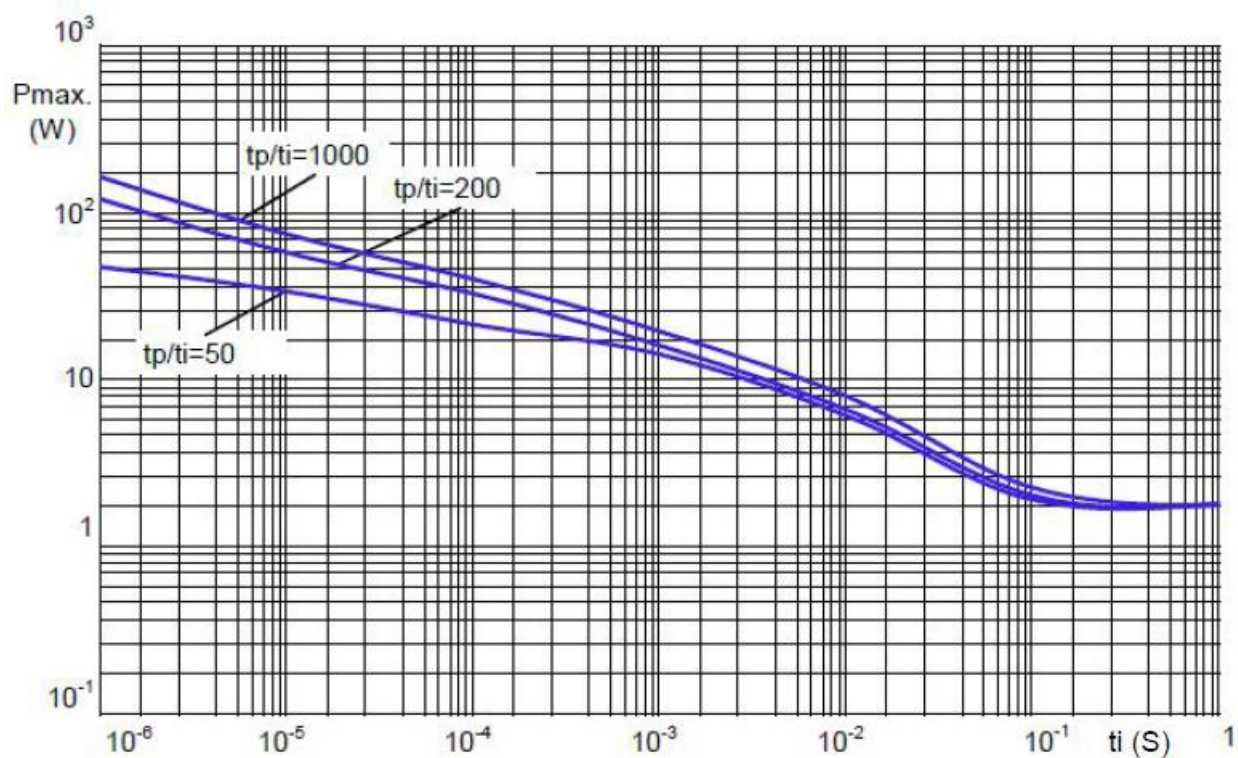
AC (rms) working voltage (V)

P=Rated power (W)

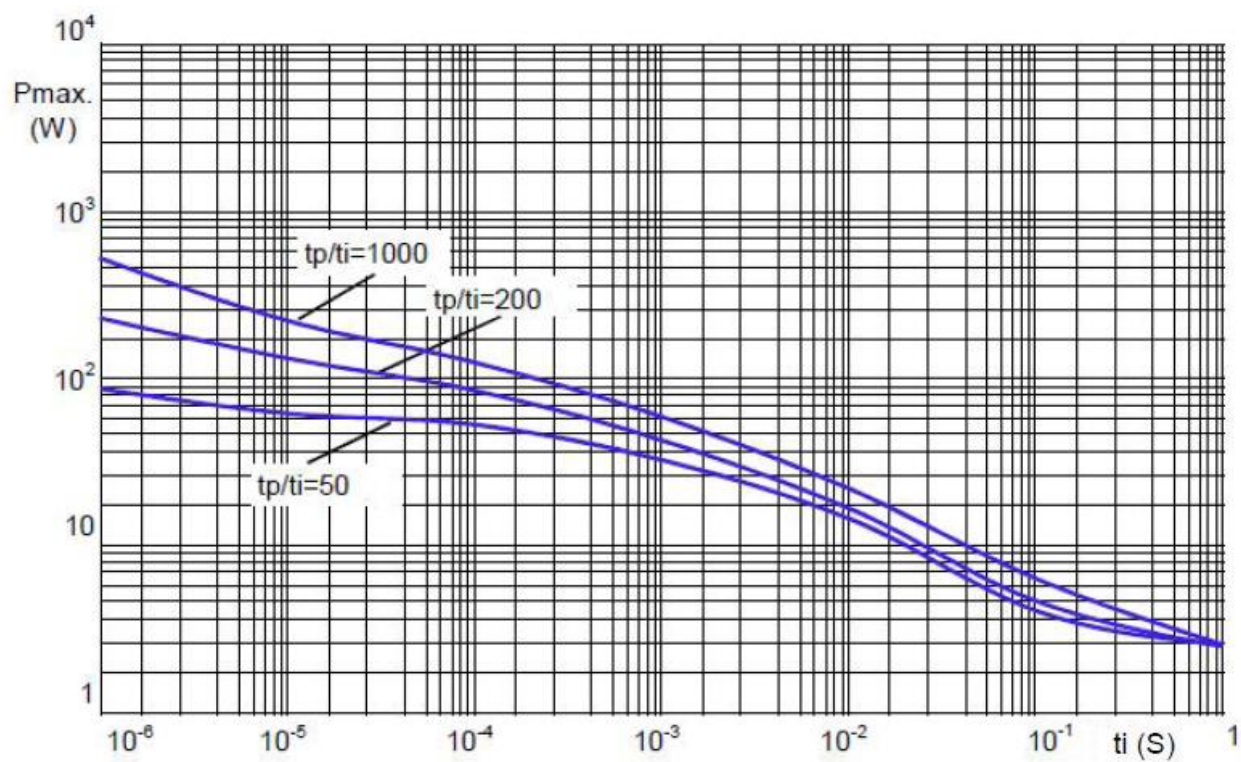
R=Resistance value (Ω)

PULSE DIAGRAMS

FMP100 Series: P_{max} : Maximum permissible peak pulse power
 t_i : Pulse duration
 t_p : Pulse repetition time

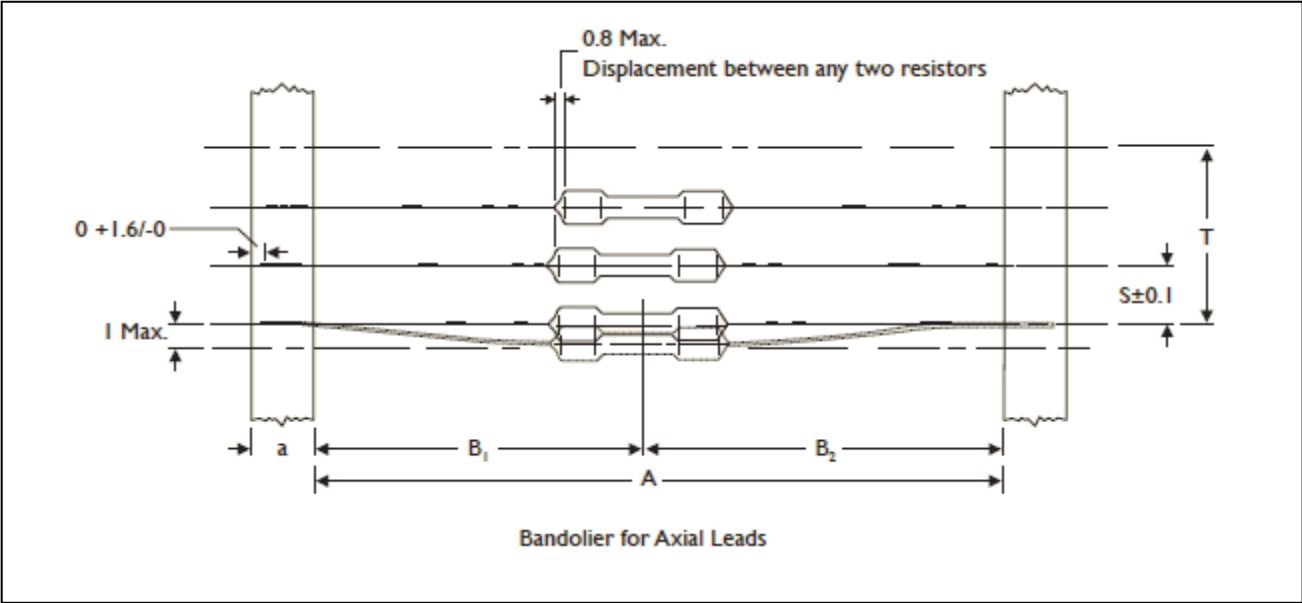


FMP200 Series: P_{max} : Maximum permissible peak pulse power
 t_i : Pulse duration
 t_p : Pulse repetition time



FMP300 Series: P_{max} : Maximum permissible peak pulse power
 t_i : Pulse duration
 t_p : Pulse repetition time

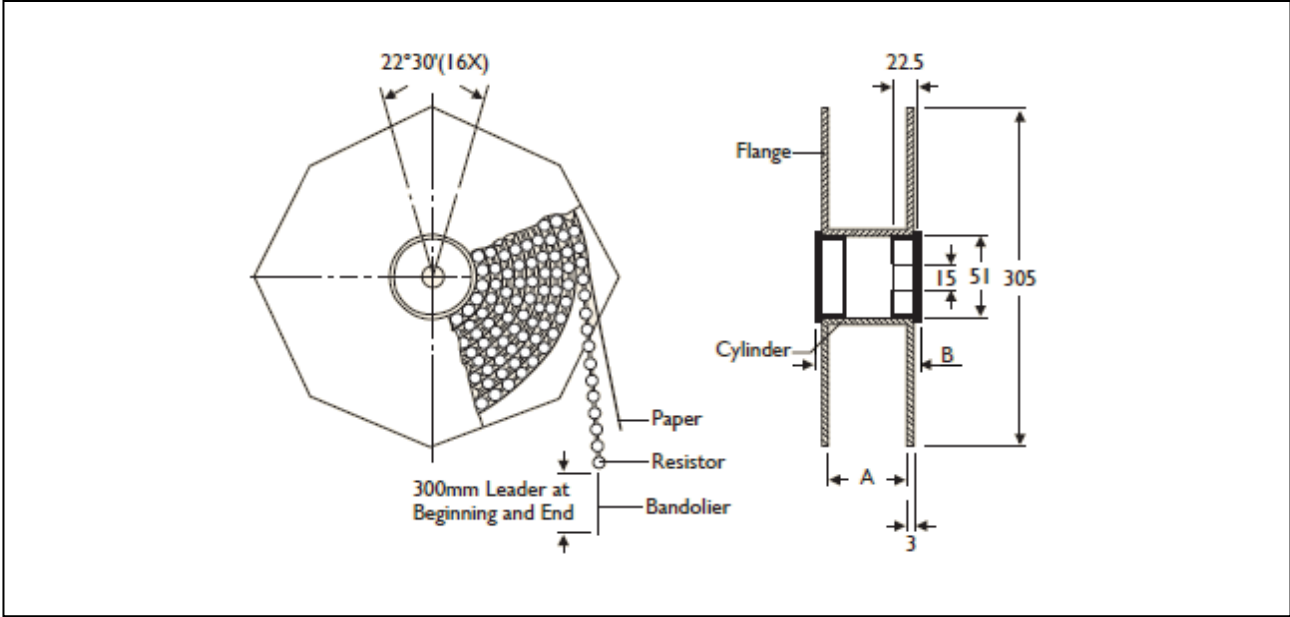
AXIAL / REEL TAPE SPECIFICATION



Unit: mm

Ultra Miniature	a	A	B1-B2 (Max.)	S (spacing)	T (max. deviation of spacing)
FMP-50	6 ± 0.5	52.4 ± 1.5	1.2	5	0.5 mm per 5 spacing 1 mm per 10 spacing
		26.0 ± 1.5	1		
FMP100 FMP200	6 ± 0.5	52.4 ± 1.5	1.2	5	
FMP3WS	6 ± 0.5	73.0 ± 1.5	1.5	5	
		52.4 ± 1.5	1.2		
FMP300	6 ± 0.5	73.0 ± 1.5	1.5	10	

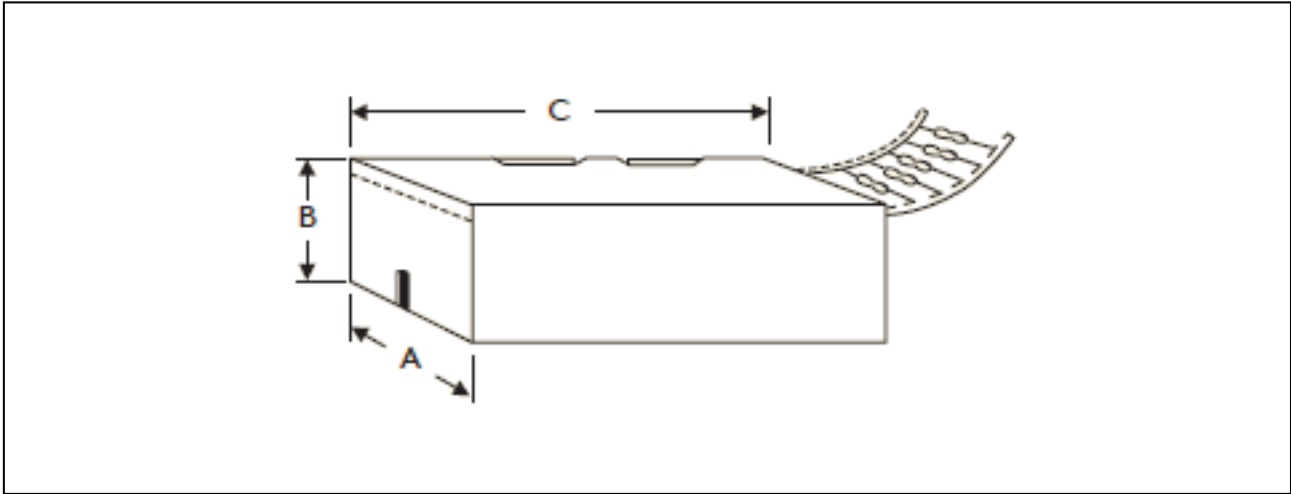
TAPE ON REEL PACKING



TYPE Unit: mm/piece

Ultra Miniature	Across Flange(A)	B	Quantity Per Reel
FMP-50	66.5	75.5	5,000
FMP100	66.5	75.5	5,000
FMP200	66.5	75.5	2,500
FMP3WS	87	96	2,000
FMP300	87	96	1,000

TAPE ON BOX PACKING



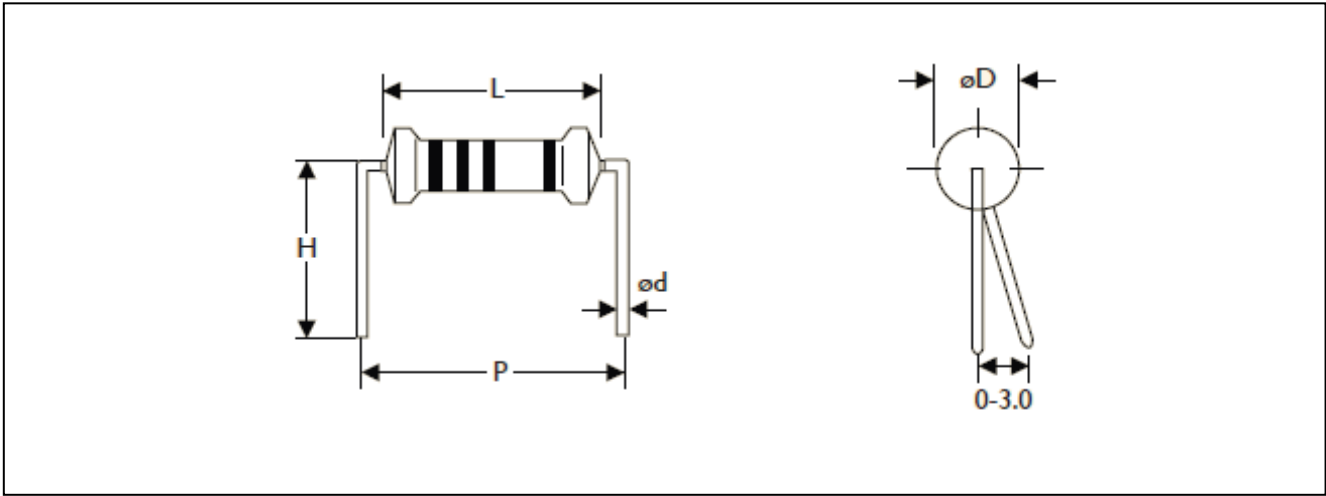
TYPE	DIMENSIONS			Unit: mm/piece
Ultra Miniature	A	B	C	Quantity Per Box
FMP-50	81	70	260	5,000
FMP100	81	104	260	5,000
FMP200	73	45	258	1,000
FMP3WS	103	78	260	1,000
FMP300	103	78	260	1,000

BULK PACKING

Ultra Miniature	Piece/Per Inner Box	Bag/Per Inner Box	Piece Per Bag
FMP-50	10,000	10	1,000
FMP100	10,000	10	1,000
FMP200	5,000	5	1,000
FMP3WS	2,000	4	500
FMP300	1,000	2	500

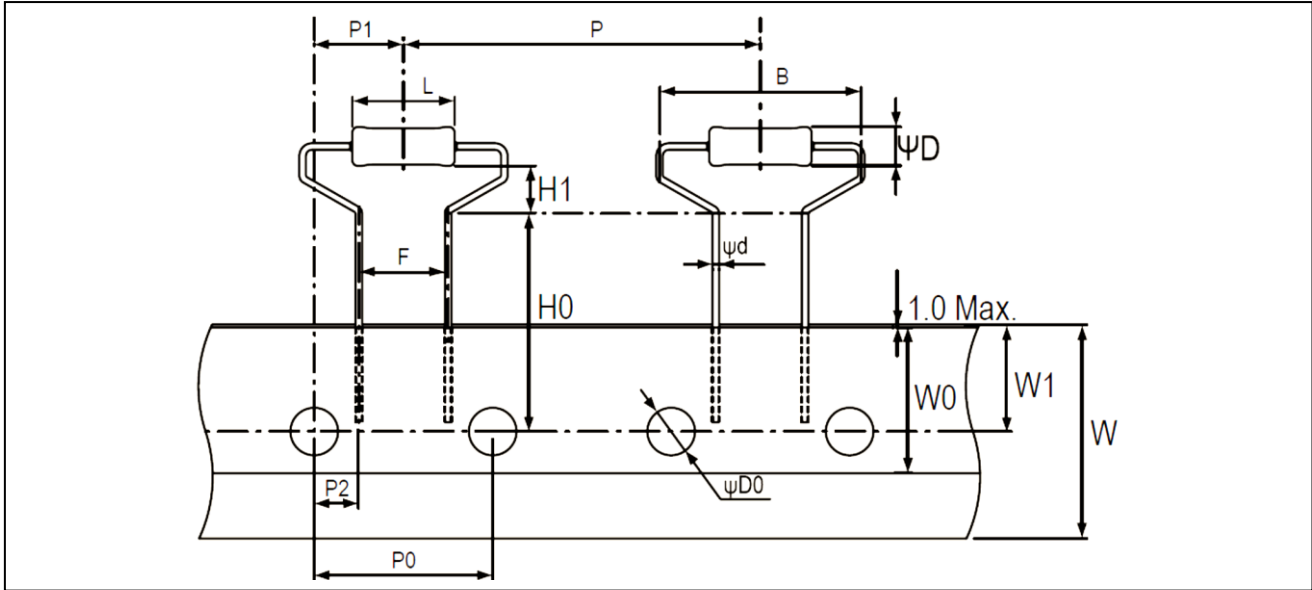
FORMING

M TYPE



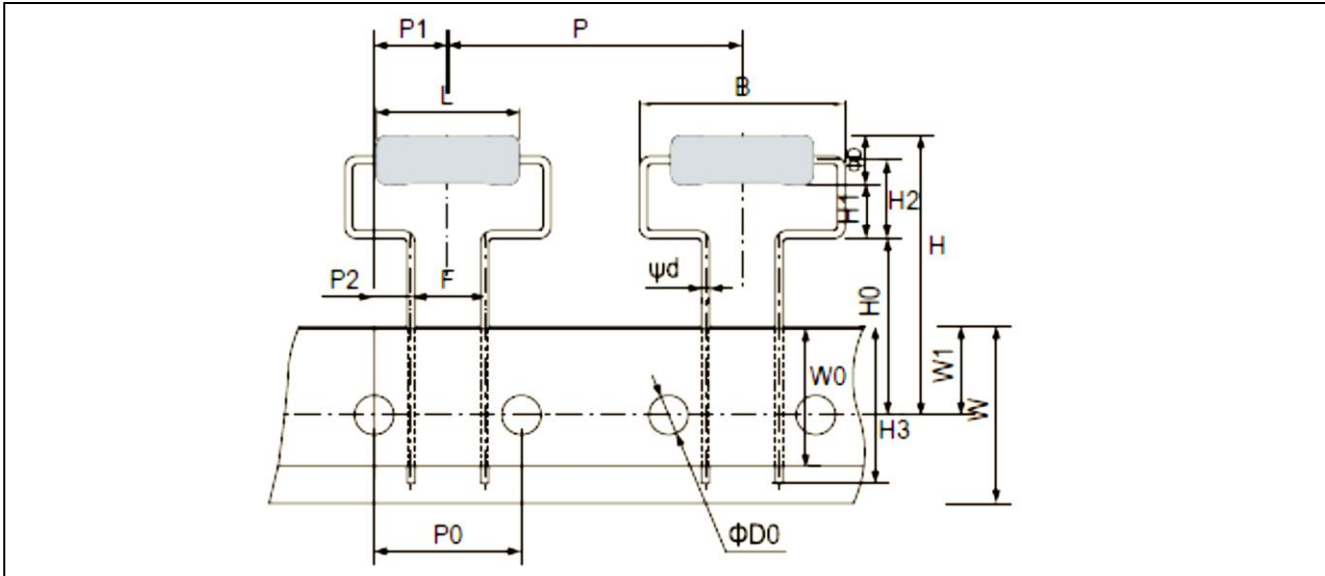
TYPE	DIMENSIONS					Unit: mm
Ultra Miniature	L	ψD	ψd	P	H	
FMP-50	3.4± 0.3	1.9 ± 0.2	0.45 ± 0.05	6.0 ± 1	10.0 ±1	
FMP100	6.3 ± 0.5	2.4 ± 0.2	0.55 ± 0.05	10.0 ± 1	10.0 ± 1	
FMP300	15.5 ± 1.0	5.0± 0.5	0.8 ± 0.05	20.0 ± 1	15.0 ± 1	

MHA TYPE



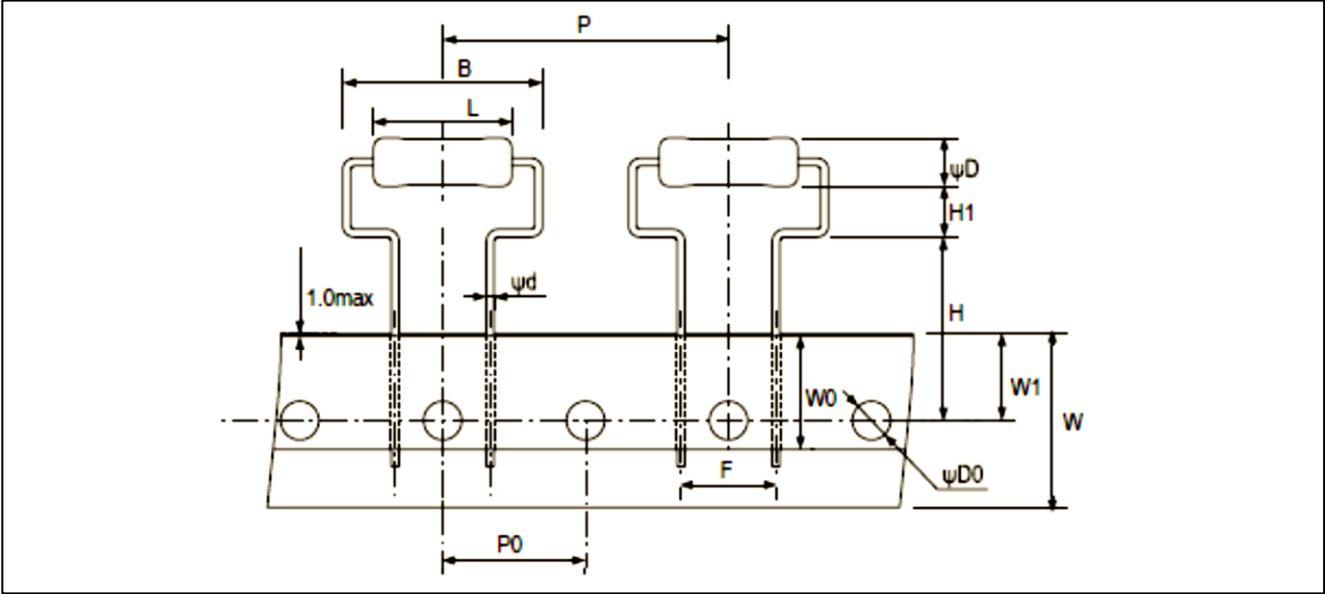
TYPE	DIMENSIONS								Unit: mm
Miniature	L	ψD	ψd	B	H0	H1	P	P0	
	9.0±0.5	3.9±0.3	0.55±0.05	17.5Max	19.0±1.0	4.0±1.0	30.0±1.0	15.0±0.3	
FMP200	P1	P2	F	W	W0	W1	ψD0		
	7.5±1.0	3.75±0.5	7.5±0.5	18.0±0.5	5.0Min	9.0±0.5	4.0±0.2		

MHB TYPE



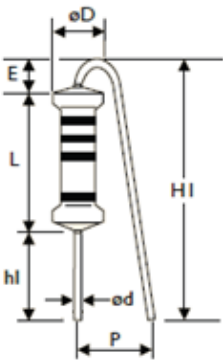
TYPE	DIMENSIONS									Unit: mm
Miniature	L	ψD	ψd	B	H	H0	H1	H2	H3	
	15.5±1.0	5.0±0.5	0.8±0.05	21.0Max.	30Max.	18.0±1.0	5.5(Ref.)	8.0±1.5	16Max.	
FMP300	P	P0	P1	P2	F	W	W0	W1	ψD0	
	30.0±1.0	15.0±0.3	7.5±1.0	3.75±0.8	7.5±0.5	18.0±0.5	5.0Min.	9.0±0.5	4.0±0.3	

MHC TYPE

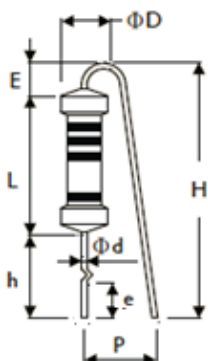


TYPE	DIMENSIONS								Unit: mm
Miniature	L	ψD	ψd	B	H	H1	P	P0	
	15.5±1.0	5.0±0.5	0.8±0.05	21.0Max.	19.0±1.0	5.25±1.0	30.0±1.0	15.0±0.3	
FMP300	F	W	W0	W1	ψD0				
	10.0±0.5	18.0±0.5	5.0Min.	9.0±0.5	4.0±0.2				

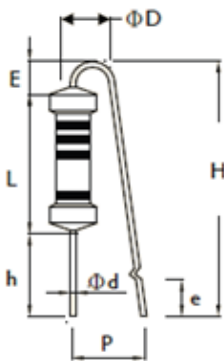
F TYPE



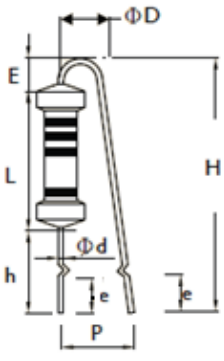
FK TYPE



FFK TYPE

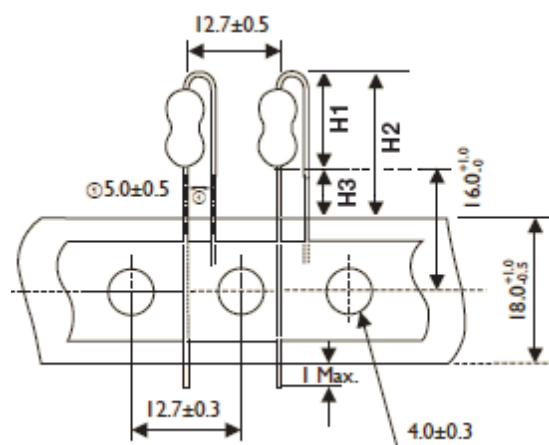


FKK TYPE



TYPE	DIMENSIONS										Unit: mm
Ultra Miniature	L	ψD	ψd	P	h	H Max.	h1	H1 Max.	E Max.	e	
FMP200	9.0±0.5	3.9±0.3	0.55±0.05	6±1	-	-	5± 1	18.5	3.5	-	
FMP300	15.5±1	5.0±0.5	0.8±0.05	8±1	8±1	28	5± 1	25	3.5	3.5±1	

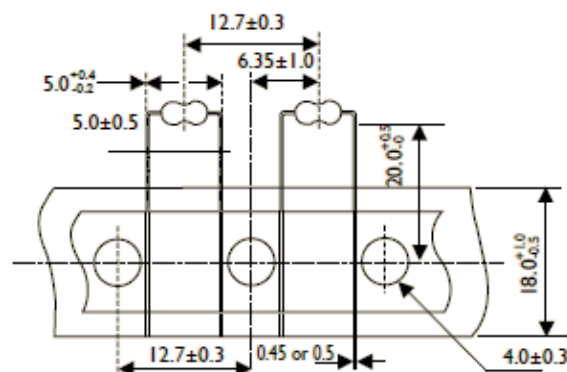
FT TYPE (Taping Pack)



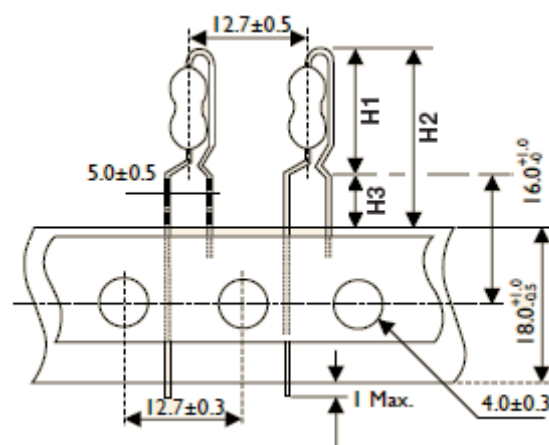
TYPE	DIMENSIONS			Unit: mm
Ultra Miniature	H1 Max.	H2 Max.	H3 Max.	
FMP100	10	18.5	8.5	
FMP200	13	21.5	8.5	
FMP3WS	16	24.5	8.5	

MT TYPE (Taping Pack)

Rated Watts : 0.5W

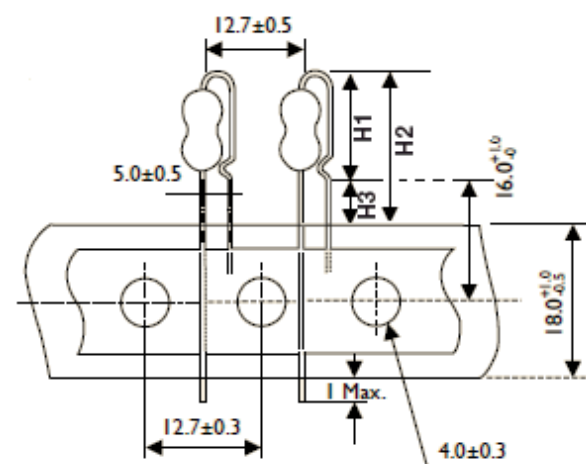


PN TYPE (Taping Pack)



TYPE	DIMENSIONS			Unit: mm
Ultra Miniature	H1 Max.	H2 Max.	H3 Max.	
FMP100	13	21.5	8.5	
FMP200	17	25.5	8.5	
FMP3WS	19	27.5	8.5	

AV TYPE (Taping Pack)



TYPE	DIMENSIONS			Unit: mm
Ultra Miniature	H1 Max.	H2 Max.	H3 Max.	
FMP100	11.5	20	8.5	
FMP200	14.5	23	8.5	
FMP3WS	17.5	26	8.5	

MARKING

4-BAND-CODE

±5%

COLOR	1st BAND	2nd BAND	3rd 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	0.001Ω	
WHITE	9	9	9	0.0001Ω	
GOLD				0.1Ω	± 5 % (J)
SILVER				0.01Ω	

±1%

5-BAND-CODE

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 6	May.14, 2024		- Added 52G type
Version 5	Apr.2, 2024		- Added forming code description for part number
Version 4	Aug.31, 2023		- Update legal disclaimer and footer version numbers
Version 3	May.25, 2023		- Updated the tape specification of FMP300
Version 2	Oct.25, 2021		- Add F type for FMP200 series
Version 1	Oct.12, 2021	-	- Updated the tape specification of FMP200
Version 0	Aug.2, 2021	-	- First issue of this specification

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