

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 25, 2023 V.3





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

FMP	200	F	T	F	52-	100R
(1)	(2)	(3)	(4)	(5)	(6)	(7)

(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

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

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

73- = 73mm

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

(7) RESISTANCE VALUE

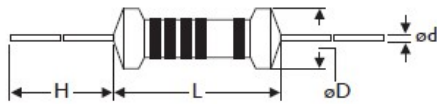
E24 & E96 Series

Example:

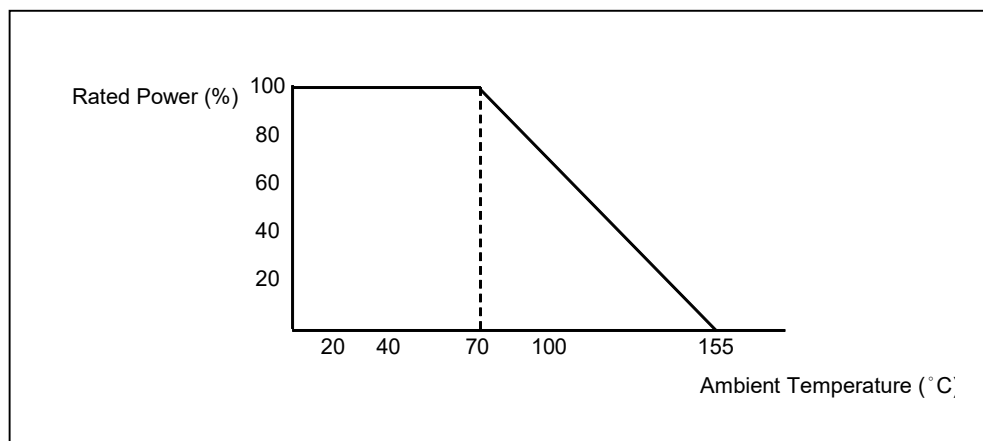
100R = 100 Ω , 10K = 10,000 Ω , 1M = 1,000,000 Ω

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

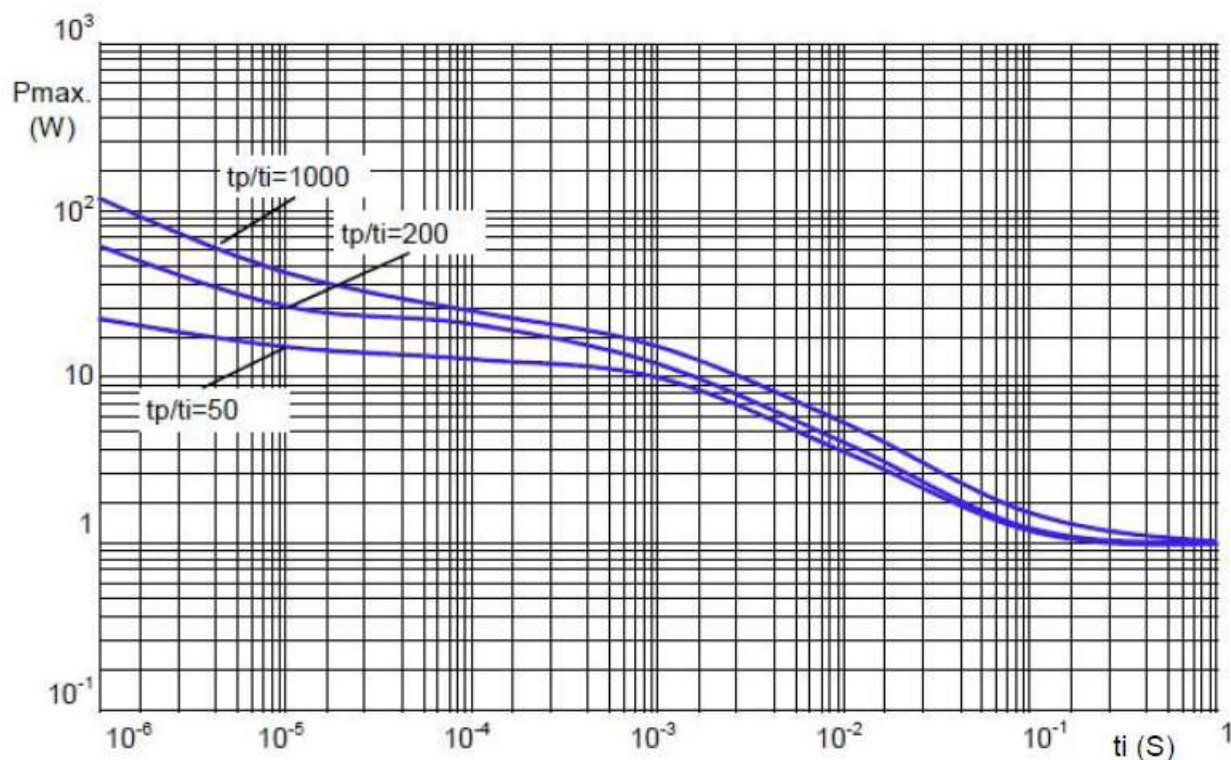
V=Continuous rated DC or

AC (rms) working voltage (V)

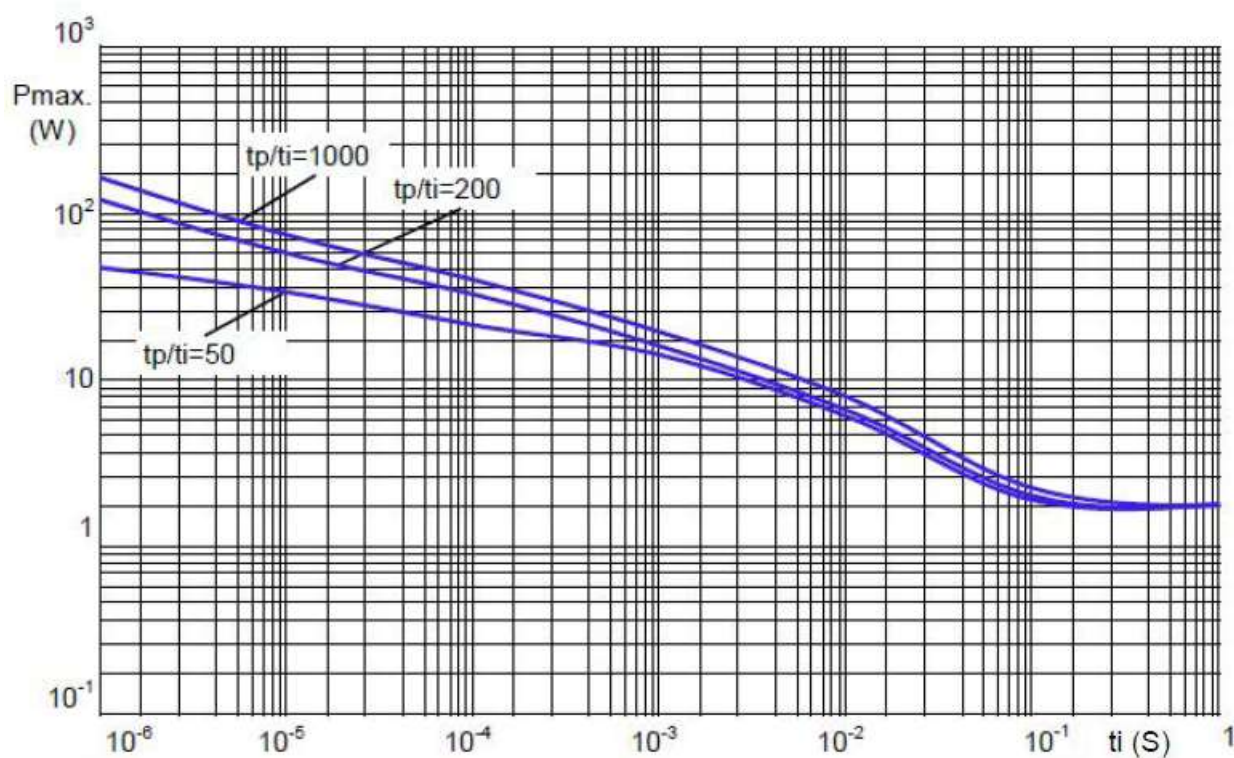
P=Rated power (W)

R=Resistance value (Ω)

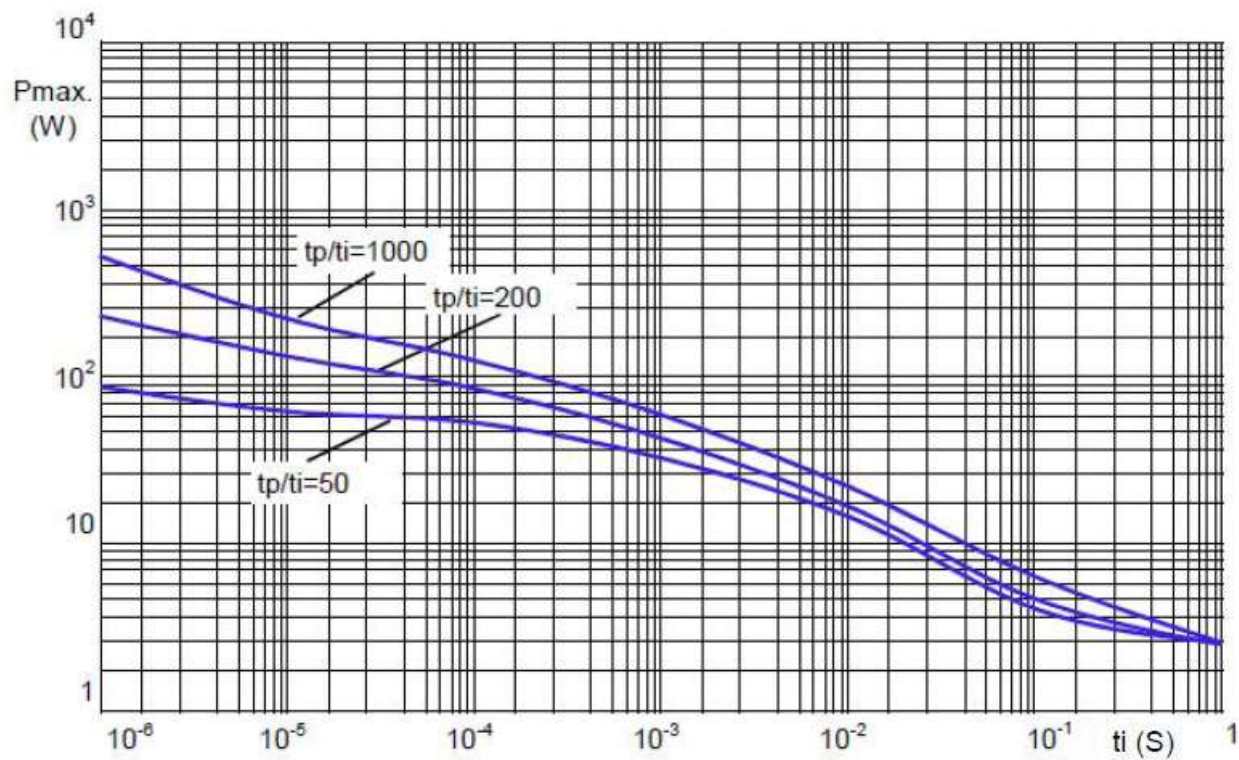
PULSE DIAGRAMS



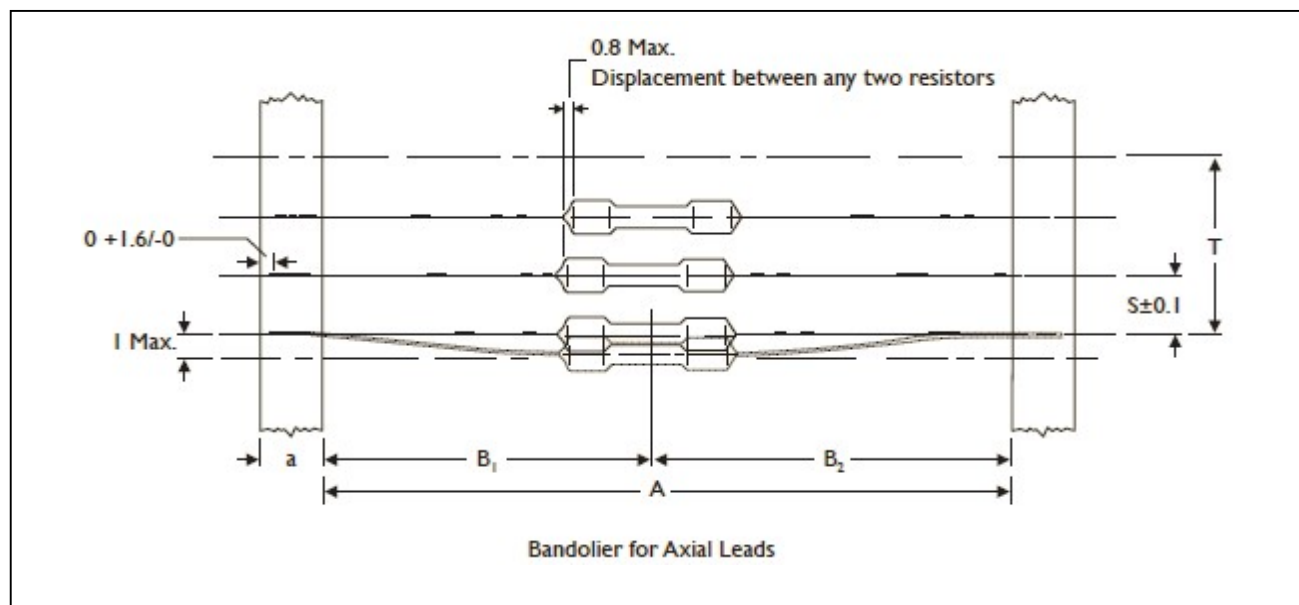
FMP100 Series: P_{max} : Maximum permissible peak pulse power
 t_i : Pulse duration
 t_p : Pulse repetition time



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

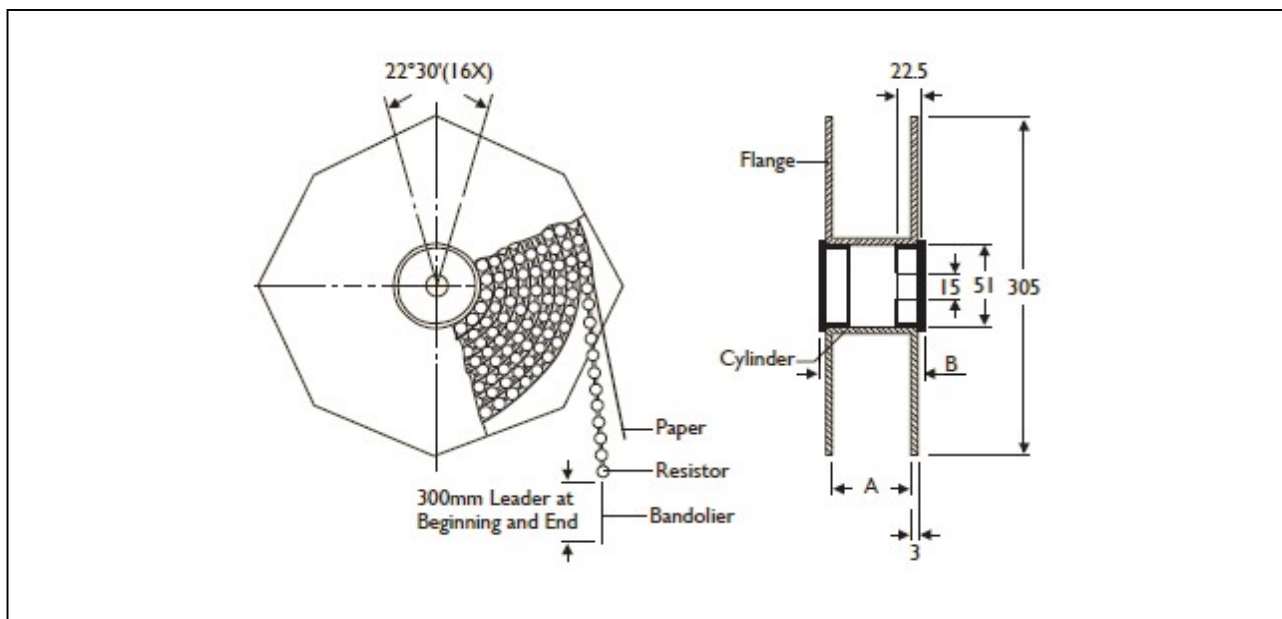


FMP300 Series: P_{max} : Maximum permissible peak pulse power
 t_i : Pulse duration
 t_p : Pulse repetition time

AXIAL / REEL TAPE SPECIFICATION

Unit: mm

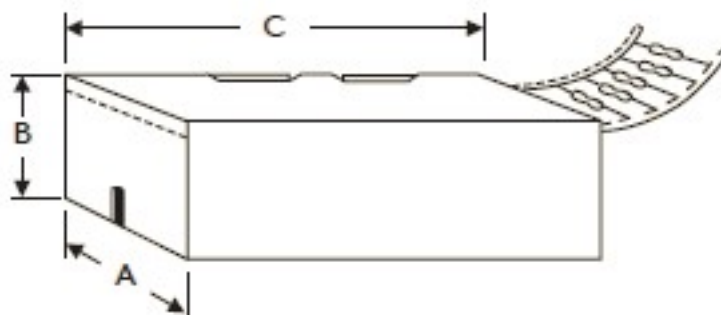
Ultra Miniature	a	A	B1-B2 (Max.)	S (spacing)	T (max. deviation of spacing)
FMP-50	6 ± 0.5	52.4 ± 1.5 26.0 ± 1.5	1.2 1	5	
FMP100 FMP200	6 ± 0.5	52.4 ± 1.5	1.2	5	0.5 mm per 5 spacing 1 mm per 10 spacing
FMP3WS	6 ± 0.5	73.0 ± 1.5 52.4 ± 1.5	1.5 1.2	5	
FMP300	6 ± 0.5	73.0 ± 1.5	1.5	10	

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

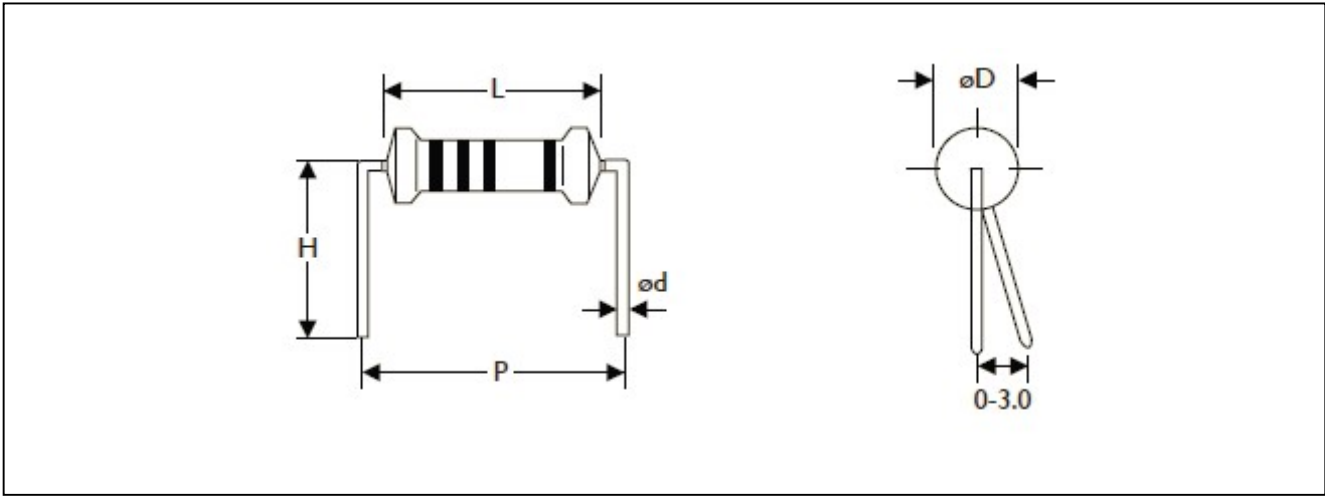
TYPE	DIMENSIONS			Unit: mm/piece
Ultra Miniature	A	B	C	Quantity Per Box
FMP-50	81	70	260	5,000
FMP100	81	104	260	5,000
FMP200	73	45	258	1,000
FMP3WS	103	78	260	1,000
FMP300	103	78	260	1,000

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

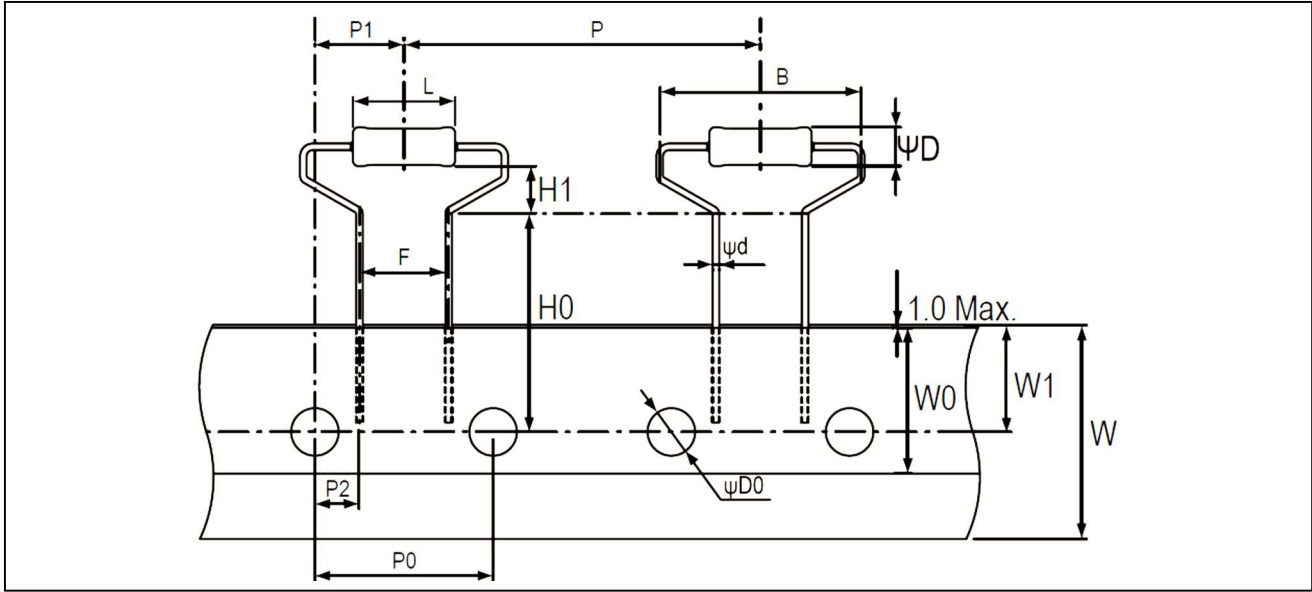
FORMING

M TYPE



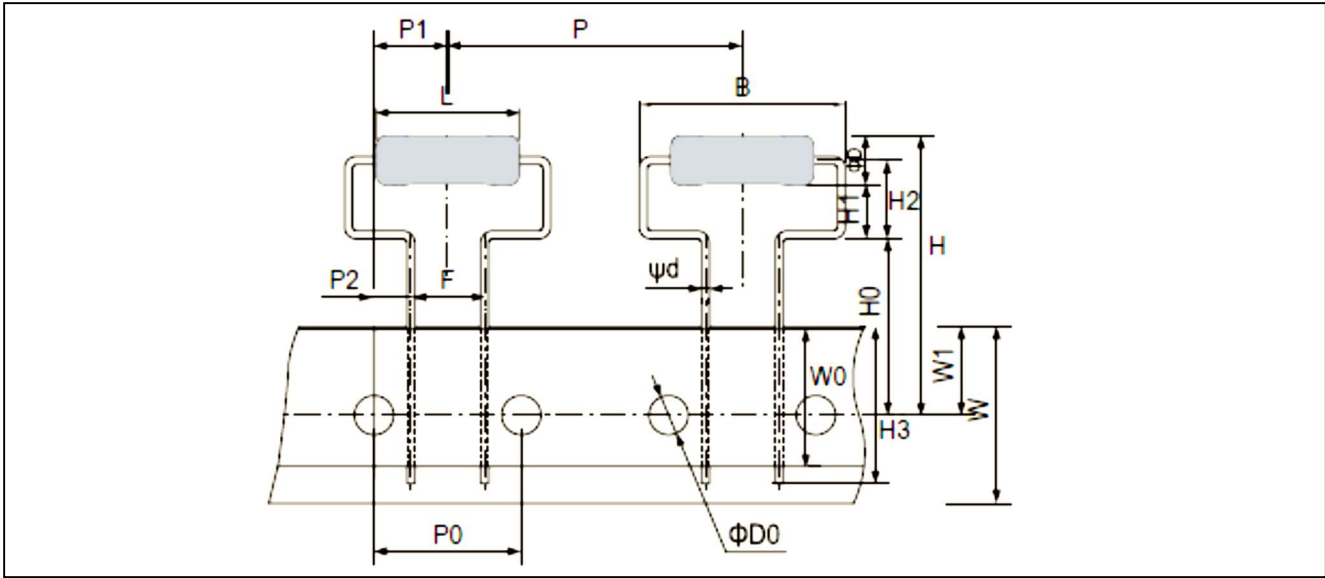
TYPE	DIMENSIONS					Unit: mm
Ultra Miniature	L	ψD	ψd	P	H	
FMP-50	3.4± 0.3	1.9 ± 0.2	0.45 ± 0.05	6.0 ± 1	10.0 ±1	
FMP100	6.3 ± 0.5	2.4 ± 0.2	0.55 ± 0.05	10.0 ± 1	10.0 ± 1	
FMP300	15.5 ± 1.0	5.0± 0.5	0.8 ± 0.05	20.0 ± 1	15.0 ± 1	

MHA TYPE



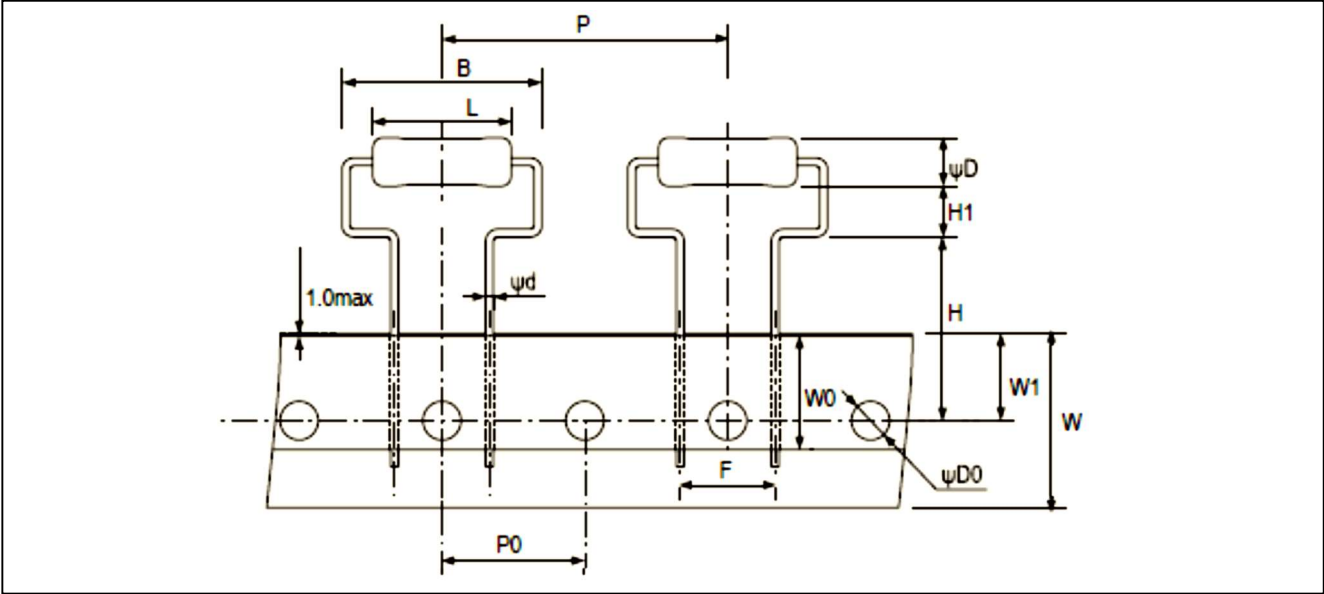
TYPE	DIMENSIONS								Unit: mm
Miniature	L	ψD	ψd	B	H0	H1	P	P0	
	9.0±0.5	3.9±0.3	0.55±0.05	17.5Max	19.0±1.0	4.0±1.0	30.0±1.0	15.0±0.3	
FMP200	P1	P2	F	W	W0	W1	ΨD0		
	7.5±1.0	3.75±0.5	7.5±0.5	18.0±0.5	5.0Min	9.0±0.5	4.0±0.2		

MHB TYPE



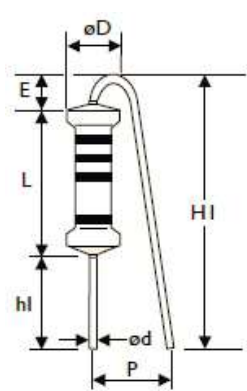
TYPE	DIMENSIONS									Unit: mm
Miniature	L	ψD	ψd	B	H	H0	H1	H2	H3	
	15.5±1.0	5.0±0.5	0.8±0.05	21.0Max.	30Max.	18.0±1.0	5.5(Ref.)	8.0±1.5	16Max.	
FMP300	P	P0	P1	P2	F	W	W0	W1	ΨD0	
	30.0±1.0	15.0±0.3	7.5±1.0	3.75±0.8	7.5±0.5	18.0±0.5	5.0Min.	9.0±0.5	4.0±0.3	

MHC TYPE

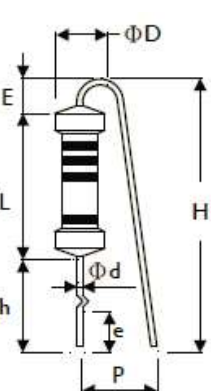


TYPE	DIMENSIONS								Unit: mm
Miniature	L	ψD	ψd	B	H	H1	P	P0	
	15.5±1.0	5.0±0.5	0.8±0.05	21.0Max.	19.0±1.0	5.25±1.0	30.0±1.0	15.0±0.3	
FMP300	F	W	W0	W1	ψD0				
	10.0±0.5	18.0±0.5	5.0Min.	9.0±0.5	4.0±0.2				

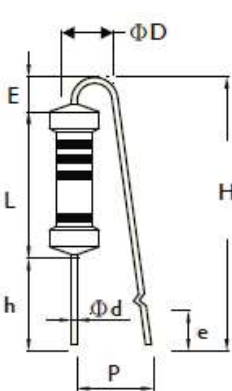
F TYPE



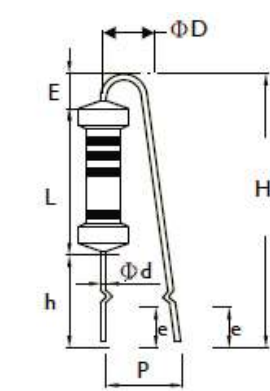
FK TYPE



FFK TYPE

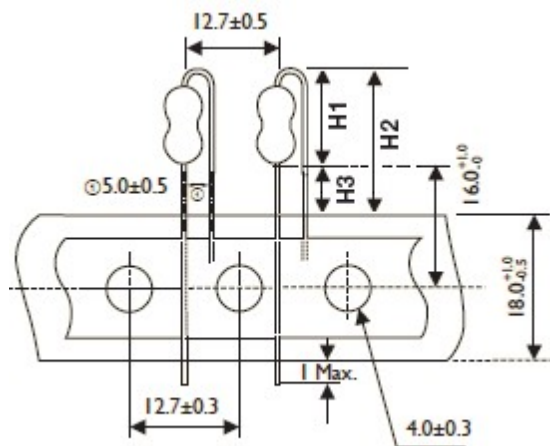


FKK TYPE



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	

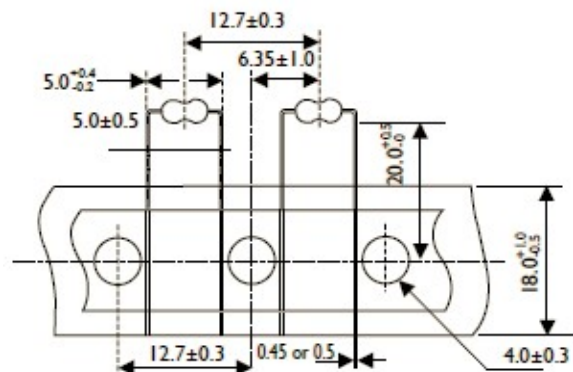
FT TYPE (Taping Pack)



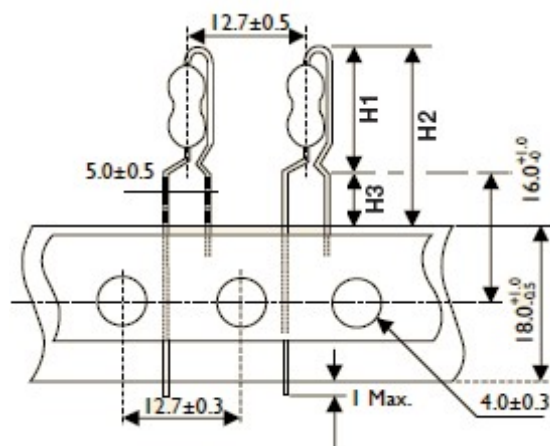
TYPE	DIMENSIONS			Unit: mm
Ultra Miniature	H1 Max.	H2 Max.	H3 Max.	
FMP100	10	18.5	8.5	
FMP200	13	21.5	8.5	
FMP3WS	16	24.5	8.5	

MT TYPE (Taping Pack)

Rated Watts : 0.5W

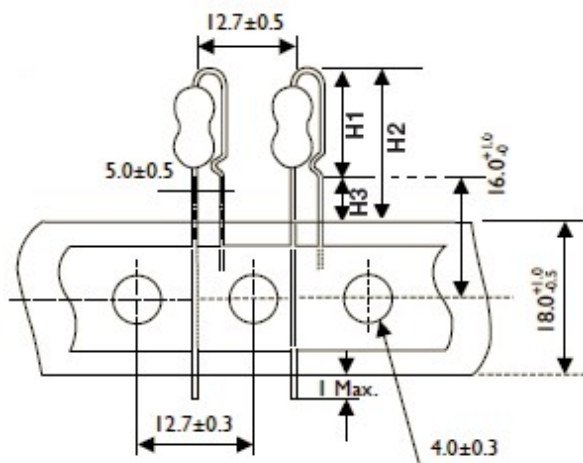


PN TYPE (Taping Pack)



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 0	Aug.2, 2021	-	- First issue of this specification
Version 1	Oct.12, 2021	-	- Updated the tape specification of FMP200
Version 2	Oct.25, 2021		- Add F type for FMP200 series
Version 3	May.25, 2023		- Updated the tape specification of FMP300

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