



Specification for Approval

Customer : **ARISTON ELECTRONICA, S.A.**

Product Name : **LEAD-FREE METAL FILM FIXED RESISTORS**

Part Name : **MF SERIES ±1%, ±2%, ±5%**

Part No. : **MFR0**F*****0**
MFR0G*****0**
MFR0J*****0**

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昆山厚聲電子工業有限公司
Uniroyal Electronics Industry Company Limited



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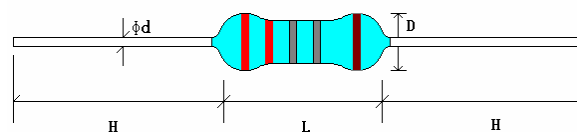
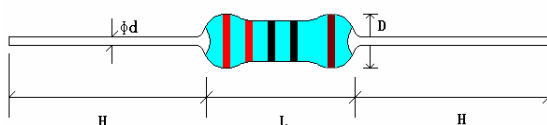
1.0 Scope:

This specification for approve relates to Lead-Free Metal Film Fixed Resistors manufactured by ROYAL PARTS.

2.0 Ratings & Dimension:

For 1/8W, 1/4WS, 0.4WSS

Other



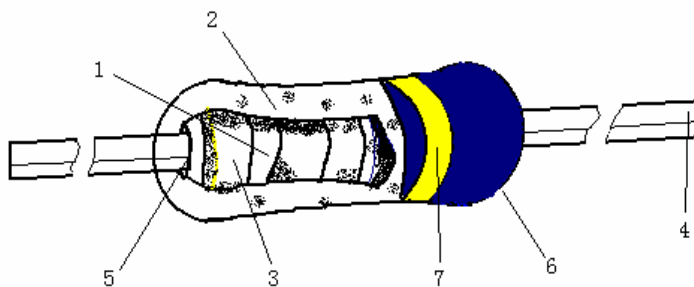
2.1 Normal size

Type	Dimension(mm)				Max Working Voltage	Max Overload Voltage	Dielectric Withstanding Voltage	Tolerance	Resistance Range
	D Max.	L Max.	d ± 0.05	H ± 3					
MF 1/8W	1.9	3.5	0.45	28	200V	400V	400V	$\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$	10 Ω ~1M Ω
MF 1/4W	2.5	6.8	0.54	28	250V	500V	500V	$\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$	10 Ω ~1M Ω
MF 1/2W	3.5	10	0.54	28	350V	700V	700V	$\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$	10 Ω ~1M Ω
MF 1W	5	12	0.65	28	500V	1000V	1000V	$\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$	10 Ω ~1M Ω
MF 2W	5.5	16	0.70	28	500V	1000V	1000V	$\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$	10 Ω ~1M Ω
MF 3W	6.5	17.5	0.75	28	500V	1000V	1000V	$\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$	10 Ω ~1M Ω

2.2 Small Size & Extra Small Size

Type	Dimension(mm)				Max Working Voltage	Max Overload Voltage	Dielectric Withstanding Voltage	Tolerance	Resistance Range
	D Max.	L Max.	d ± 0.05	H ± 3					
MF 1/4WS	2	3.5	0.45	28	200V	400V	200V	$\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$	10 Ω ~1M Ω
MF 0.4WSS	2	3.5	0.45	28	200V	400V	200V	$\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$	10 Ω ~1M Ω
MF 1/2WSS	2.7	6.8	0.54	28	250V	500V	250V	$\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$	10 Ω ~1M Ω
MF 1/2WS	3	9	0.54	28	350V	700V	700V	$\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$	10 Ω ~1M Ω
MF 0.6WS	2.7	6.8	0.54	28	250V	500V	250V	$\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$	10 Ω ~1M Ω
MF 1WS	4.0	10	0.65	28	350V	600V	350V	$\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$	10 Ω ~1M Ω
MF 2WS	5	12	0.65	28	350V	600V	350V	$\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$	10 Ω ~1M Ω
MF 3WS	5.5	16	0.70	28	350V	600V	350V	$\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$	10 Ω ~1M Ω

3.0 Construction:



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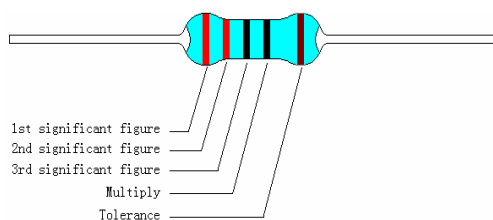
No.	Name	Material
1	Basic Body	Rod type ceramics
2	Resistor	Metal Film
3	End Cap	Cold steel plated with copper/tin
4	Lead Wire	Tin solder coated copper wire
5	Joint	By Welding
6	Coating	(1). Celluloid paint
		(2) Insulated Resin (Normal size; 1/2WS): Blue (Small size): Light Green 0.4WSS: Deep Green
7	Color Code	Epoxy resin

4.0 Resistor marked:

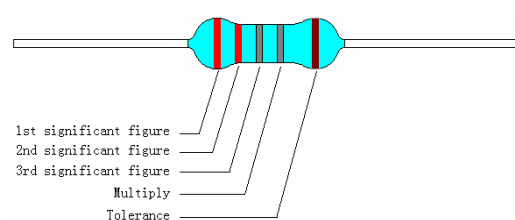
Resistors shall be marked with color coding

Colors shall be in accordance with JIS C 0802

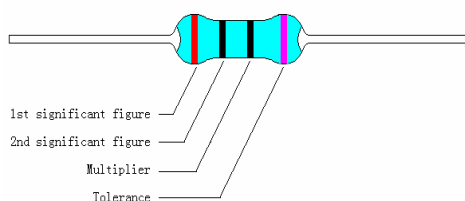
For 1/8W, 1/4WS, 0.4WSS ($\pm 1\%$)



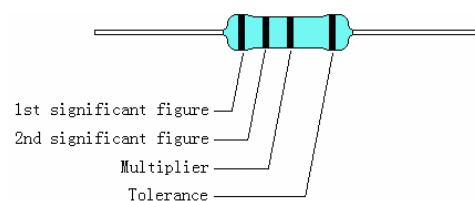
The other



For 1/8W, 1/6W, 1/4WS, 0.4WSS ($\pm 2\%$, $\pm 5\%$)



The other



4.1 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: 1/2W	VAL: 100Ω
Q'TY: 1,000	TOL: 1%
LOT: 0021548	PPM: 50

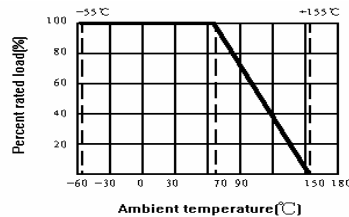
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5.0 Derating Curve:

Resistors shall have a power rating based on continuous load operation at an ambient temperature from -55°C to 70°C. For temperature in excess of 70°C, the load shall be derate as shown in figure 1

Figure1



5.1 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 corresponding to the power rating, as determined from the following formula:

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

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

P = power rating (WATT.) R= nominal resistance (OHM)

The overload voltage is 2.5 times RCWV or Max. Overload voltage whichever is less.

6.0 Performance Specification:

Characteristic	Limits		Test Method (JIS-C-5201&5202)
Temperature Coefficient	±1%	±50PPM/°C Max..	4.8 natural resistance changes per temp. Degree centigrade $\frac{R_2 - R_1}{R_1(T_2 - T_1)} \times 10^6 \text{ (PPM/°C)}$ R ₁ : Resistance value at room temp. (T ₁) R ₂ : Resistance value at room temp.+100°C (T ₂) Test pattern: room temp. (T ₁), room temp. +100°C (T ₂)
	±2%	±100PPM/°C Max.	
	±5%	±200PPM/°C Max..	
Short-time overload	Resistance change rate is: ±(0.5%+0.05Ω)Max. With no evidence of mechanical damage.		4.13 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.		4.7 Resistors shall be clamped in the trough of a 90°metallic v-block and shall be tested at ac potential respectively specified in the above list for 60-70 seconds.
Pulse overload	Resistance change rate is: ±(1%+0.05Ω) Max. With no evidence of mechanical damage.		4.28 Resistance change after 10,000 cycles (1 second "ON ", 25 seconds "OFF ") at 4 times RCWV.
Resistance to soldering heat	Resistance change rate is: ±(1%+0.05Ω) Max. With no evidence of mechanical damage		4.18 Permanent resistance change when leads immersed to a point 2.0-2.5mm from the body in 260°C±5°C solder for 10±1 seconds.

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Resistance to solvent	No deterioration of protective coatings & markings	4.29 Specimens shall be immersed in a bath of trichloroethylene completely for 3 min. With ultrasonic															
Terminal strength	No evidence of mechanical damage	4.16 Direct load: Resistance to a 2.5 kg direct load for 10 seconds 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.															
Solderability	95% coverage Min.	4.17 The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Test temp. Of solder: 245°C ± 3°C Dwell time in solder: 2~3seconds.															
Temperature cycling	Resistance change rate is: ±(1%+0.05Ω) Max.. With no evidence of mechanical damage.	4.19 Resistance change after continuous five cycles for duty cycle specified: <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55°C ± 3°C</td> <td>30mins</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>10 – 15mins</td> </tr> <tr> <td>3</td> <td>+155°C ± 2°C</td> <td>30mins</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>10 – 15mins</td> </tr> </tbody> </table>	Step	Temperature	Time	1	-55°C ± 3°C	30mins	2	Room temp.	10 – 15mins	3	+155°C ± 2°C	30mins	4	Room temp.	10 – 15mins
Step	Temperature	Time															
1	-55°C ± 3°C	30mins															
2	Room temp.	10 – 15mins															
3	+155°C ± 2°C	30mins															
4	Room temp.	10 – 15mins															
Load life in humidity	Normal type: ±1.5%; flame retardant type: ±5%	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°C ± 2°C and 90 to 95% relative humidity.															
Load life	Normal type: ±1.5%; flame retardant type: ±5%	4.25.1 permanent resistance change after 1,000 hours operating at RCWV with duty cycle of 1.5 hours "ON", 0.5 hour "OFF" at 70°C ± 2°C ambient.															

7.0 Explanation of Part No. System:

The standard Part No. includes 14 digits with the following explanation:

7.1 Coated type, the 1st to 3rd digits are to indicate the product type and 4th digit is the special feature.

Example: MFRF= Metal Film Fixed Resistors Non-flame type;

7.2 5th~6th digits:

7.2.1 This is to indicate the wattage or power rating. To dieting the size and the numbers,

The following codes are used; and please refer to the following chart for detail:

W=Normal Size; S=Small Size; U=Extra Small Size; "1" ~ "G" to denotes "1" ~ "16" as Hexadecimal:

1/16W~1/2W (<1W)

Wattage	1/2	1/3	1/4	1/5	1/6	1/8	0.6	0.4
Normal Size	W2	W3	W4	W5	W6	W8	/	/
Small Size	S2	S3	S4	S5	S6	S8	06	/
Extra Small Size	U2	U3	U4	U5	U6	U8	/	04

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1W~16W ($\geq 1W$)

Wattage	1	2	3	5	7	8	9	10	15
Normal Size	1W	2W	3W	5W	7W	8W	9W	AW	FW
Small Size	1S	2S	3S	5S	7S	8S	9S	AS	FS
Extra Small Size	1U	2U	3U	5U	7U	8U	9U	AU	FU

7.2.2 For power rating less than 1 watt, the 5th digit will be the letters W, S or U to represent the size required & the 6th digit will be a number or a letter code.

Example: WA=1/10W; U2=1/2W-SS.

7.2.3 For power of 1 watt to 16 watt, the 5th digit will be a number or a letter code and the 6th digit will be the letters of W, S or U.

Example: AW=10W; 3S=3W-S

7.3 The 7th digit is to denote the Resistance Tolerance. The following letter code is to be used for indicating the standard Resistance Tolerance.

F=±1% G=±2% J=±5% K= ±10%

7.4 The 8th to 11th digits is to denote the Resistance Value.

7.4.1 For the standard resistance values of E-24 series, the 8th digit is “0”, the 9th & 10th digits are to denote the significant figures of the resistance and the 11th digit is the number of zeros following;

For the standard resistance values of E-96 series, the 8th digit to the 10th digits is to denote the significant figures of the resistance and the 11th digit is the zeros following.

7.4.2 The following number s and the letter codes are to be used to indicate the number of zeros in the 11th digit:

0=10⁰ 1=10¹ 2=10² 3=10³ 4=10⁴ 5=10⁵ 6=10⁶ J=10⁻¹ K=10⁻² L=10⁻³ M=10⁻⁴

7.4.3 The 12th, 13th & 14th digits.

The 12th digit is to denote the Packaging Type with the following codes:

A=Tape/Box (Ammo pack) B=Bulk/Box
T=Tape/Reel P=Tape/Box of PT-26 products

7.4.4 The 13th digit is normally to indicate the Packing Quantity of Tape/Box & Tape/Reel packaging types. Except for Chip products Bulk packing, this digit should be filled “0” or other products with Bulk/Box packing requirement. The following letter code is to be used for some packing quantities:

A=500pcs B=2500pcs C=10000pcs D=20000pcs G=25000pcs H=50000pcs

7.4.5 For the FORMED type products, the 13th & 14th digits are used to denote the forming types of the product with the following letter codes:

MF=M-type with flattened lead wire F0= F-type
MK= M-type with kinked lead wire F1= F1-type
ML= M-type with normal lead wire F2= F2-type
MC= M type with kinked lead and narrow pitch wire F3= F3-type

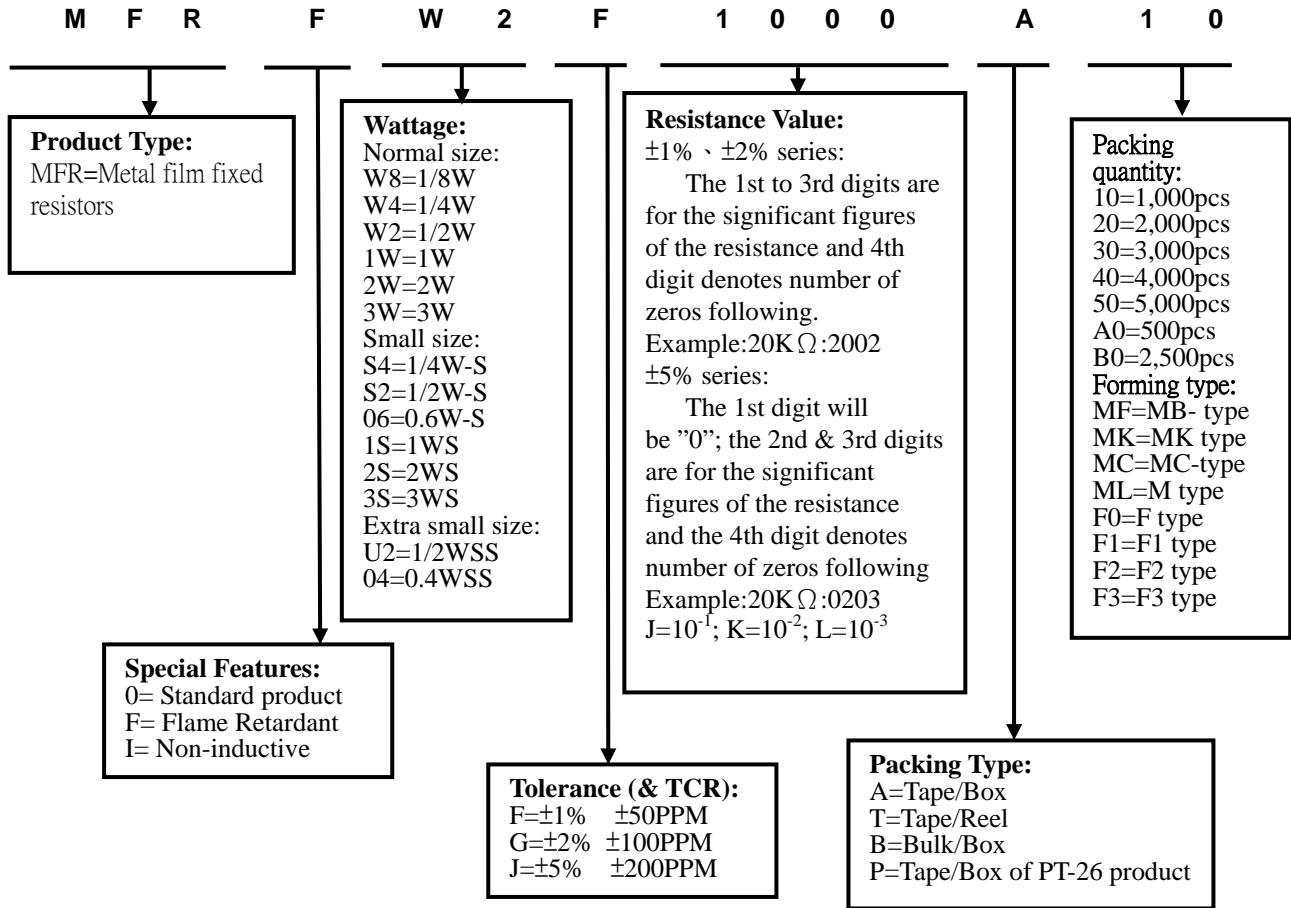
7.4.6 For some items, the 14th digit alone can use to denote special features of additional information with the following codes:

P=Panaset type 1=Avisert type 1 2=Avisert type 2
3=Avisert type 3 A=Cutting type CO 1/4W-A type B= Cutting type CO 1/4W-B type

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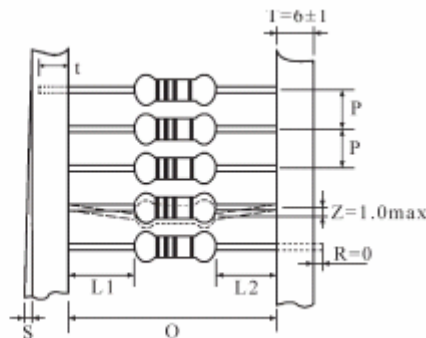
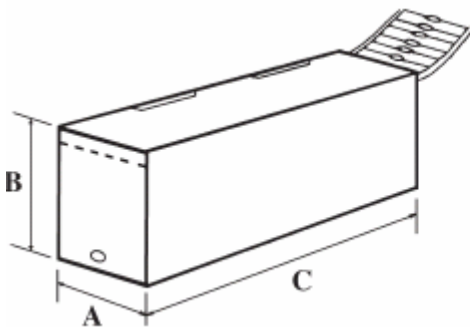


8.0 Ordering Procedure (Example: MF 1/2W $\pm 1\%$ 100 Ω T/B-1000)



9.0 Standard Packing:

9.1 Tapes in Box Packing



*L1-L2=1.0 Max.
ZW: 0
**S=0.5 Max.
PT-26: 0.8 Max.

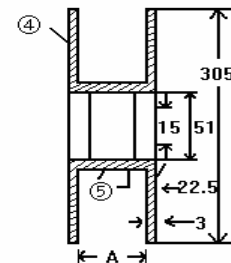
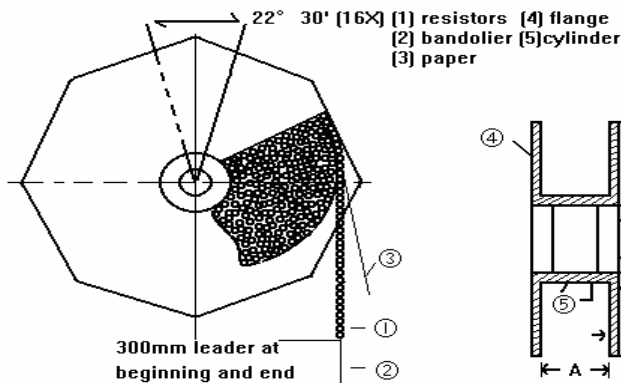
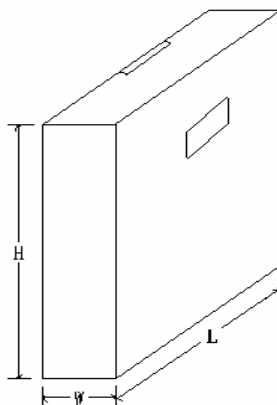
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Dimension of T/B (mm)

Part No.	O	P	A±5	B±5	C±5	Qty/Box
MF 1/8W	52±1	5±0.3	75	70	255	5,000pcs
MF 1/4WS	52±1	5±0.3	75	70	255	5,000pcs
MF 1/4W	52±1	5±0.3	75	98	255	5,000pcs
MF 0.4WSS	52±1	5±0.3	75	70	255	5,000pcs
MF 1/2WSS	52±1	5±0.3	75	116	255	5,000pcs
MF 1/2WS	52±1	5±0.3	75	70	255	2,000pcs
MF 1/2W	52±1	5±0.3	75	45	255	1,000pcs
MF 0.6WS	52±1	5±0.3	75	116	255	5,000pcs
MF 1WS	58±1	5±0.3	80	70	255	1,000pcs
MF 1W	58±1	5±0.3	80	82	255	1,000pcs
MF 2WS	58±1	5±0.3	80	82	255	1,000pcs
MF 2W	65±5	10±0.5	90	88	255	1000pcs
MF 3WS	65±5	10±0.5	90	119	255	1000pcs
MF 3W	65±5	10±0.5	90	88	255	500pcs

9.2 Tapes in Reel Packing



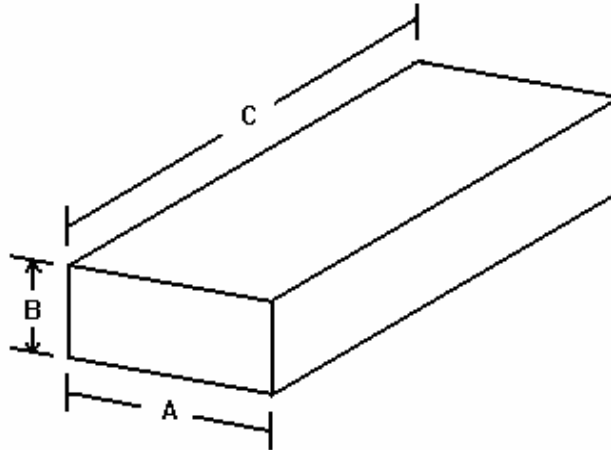
Dimension of Reel (mm)

Part No.	A	W±5	H±5	L±5	Qty/Box
MF 1/8W	73±2	85	295	293	5,000pcs
MF 1/4WS	73±2	85	295	293	5,000pcs
MF 1/4W	73±2	85	295	293	5,000pcs
MF 0.4WSS	73±2	85	295	293	5,000pcs
MF 1/2WSS	73±2	85	295	293	5,000pcs
MF 1/2WS	73±2	85	295	293	4,000pcs
MF 1/2W	73±2	85	295	293	4,000pcs
MF 0.6WS	73±2	85	295	293	5,000pcs
MF 1WS	73±2	85	295	293	2,500pcs
MF 1W	73±2	85	295	293	2,500pcs
MF 2WS	73±2	85	295	293	2,500pcs
MF 2W	80±5	95	295	293	1,000pcs
MF 3WS	80±5	95	295	293	1,000pcs
MF 3W	80±5	95	295	293	1,000pcs

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9.3 Bulk in Box Packing



Dimension of Box (mm)

Part No.	A±5	B±5	C±5	Qty/Box
MF 1/8W	140	80	240	1,000/20,000pcs
MF 1/4WS	140	80	240	1,000/20,000pcs
MF 1/4W	140	80	240	500/20,000pcs
MF 0.4WSS	140	80	240	1,000/20,000pcs
MF 1/2WSS	140	80	240	500/10,000pcs
MF 1/2WS	140	80	240	500/8,000pcs
MF 1/2W	140	80	240	250/2,000pcs
MF 0.6WS	140	80	240	500/10,000pcs
MF 1WS	140	80	240	200/4,000pcs
MF 1W	140	80	240	100/2,500pcs
MF 2WS	140	80	240	100/2,500pcs
MF 2W	140	80	240	100/1,500pcs
MF 3WS	140	80	240	100/1,500pcs
MF 3W	140	80	240	100/1,500pcs

10.0 Storage:

The products should be placed in the dry and ventilation with 15~35°C and lower than 25~75%RH, and prevent it from pressing and humidity. The guaranteed period of product performance is within one year from shipment by the company, provided that the above-mentioned storage conditions have been satisfied.

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