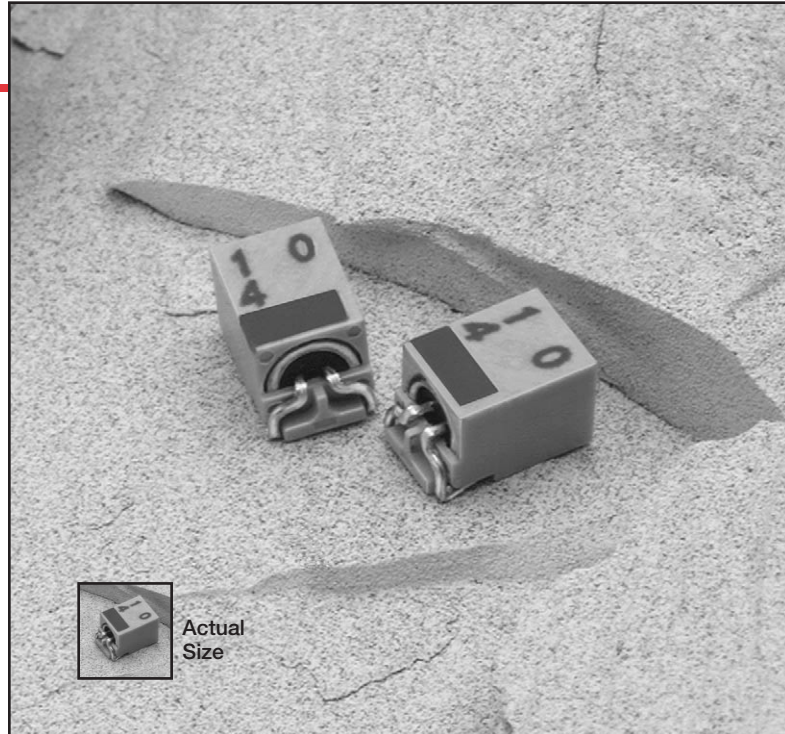


- Surface Mount
- Bi-Polar
- Low Profile Horizontal Chip
- Solvent Proof
- +85°C Maximum Temperature



The MFBP series are the bi-polar versions of the MF series. These surface mount capacitors are designed for use in circuits which have a reversed or unknown polarity. Please note that these capacitors should not be used in applications in which the specified ripple current ratings are exceeded.

The MFBP series capacitors were developed to withstand HCFC cleaning agents for five minutes by ultrasonic, vapor or immersion. This solvent proof design allows all circuit board components to be cleaned together, at the same time, without resorting to more expensive epoxy end-sealed capacitors. Refer to the Mini-Glossary for recommended cleaning conditions.

## Summary of Specifications

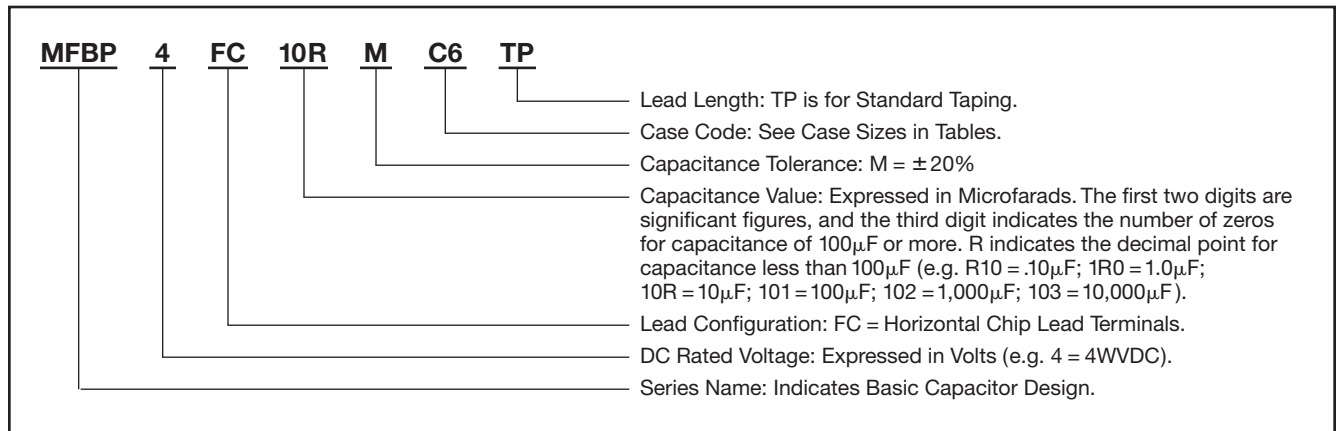
- Surface mount lead terminals.
- Capacitance range: 0.1 to 22 $\mu$ F.
- Voltage range: 4 to 50VDC.
- Operating temperature range: -40°C to +85°C.
- Leakage current: 0.05CV or 10 $\mu$ A, whichever is greater, after 2 minutes at +20°C.
- Standard capacitance tolerance:  $\pm$ 20%
- Nominal case size (H  $\times$  L): 3.5  $\times$  6.3mm to 4.5  $\times$  8.3mm.
- Rated lifetime: 2,000 hours at +85°C.

# MFBP Series

## MFBP Specifications

Item	Characteristics																																											
Operating Temperature Range	- 40 to +85°C																																											
Rated Voltage Range	4 to 50VDC																																											
Capacitance Range	0.1 to 22μF																																											
Capacitance Tolerance	± 20% (M) at +20°C, 120Hz																																											
Leakage Current	I = 0.05CV or 10μA, whichever is greater, after 2 minutes at +20°C. Where I = Leakage current (μA), C = Nominal capacitance (μF) and V = Rated voltage (V)																																											
Dissipation Factor (Tan δ)	At +20°C, 120Hz <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Rated Voltage (V)</th> <th>4</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> </tr> </thead> <tbody> <tr> <td>Size B6 &amp; C6</td> <td>0.50</td> <td>0.35</td> <td>0.30</td> <td>0.26</td> <td>0.24</td> <td>0.22</td> <td>0.22</td> </tr> <tr> <td>Size D6 &amp; D8</td> <td>0.45</td> <td>0.32</td> <td>0.26</td> <td>0.24</td> <td>0.22</td> <td>0.20</td> <td>0.20</td> </tr> </tbody> </table>	Rated Voltage (V)	4	6.3	10	16	25	35	50	Size B6 & C6	0.50	0.35	0.30	0.26	0.24	0.22	0.22	Size D6 & D8	0.45	0.32	0.26	0.24	0.22	0.20	0.20																			
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Size B6 & C6	0.50	0.35	0.30	0.26	0.24	0.22	0.22																																					
Size D6 & D8	0.45	0.32	0.26	0.24	0.22	0.20	0.20																																					
Low Temperature Characteristics	At 120Hz, impedance (Z) ratio between the - 25°C or - 40°C value and +20°C value shall not exceed the values given below. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th colspan="2">Rated Voltage (V)</th> <th>4</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Z(-25°C) / Z(+20°C)</td> <td>Size B6 &amp; C6</td> <td>9</td> <td>6</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Size D6 &amp; D8</td> <td>7</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td rowspan="2">Z(-40°C) / Z(+20°C)</td> <td>Size B6 &amp; C6</td> <td>17</td> <td>12</td> <td>9</td> <td>7</td> <td>5</td> <td>4</td> <td>4</td> </tr> <tr> <td>Size D6 &amp; D8</td> <td>15</td> <td>10</td> <td>8</td> <td>6</td> <td>4</td> <td>3</td> <td>3</td> </tr> </tbody> </table>	Rated Voltage (V)		4	6.3	10	16	25	35	50	Z(-25°C) / Z(+20°C)	Size B6 & C6	9	6	4	3	2	2	2	Size D6 & D8	7	4	3	2	2	2	2	Z(-40°C) / Z(+20°C)	Size B6 & C6	17	12	9	7	5	4	4	Size D6 & D8	15	10	8	6	4	3	3
Rated Voltage (V)		4	6.3	10	16	25	35	50																																				
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Z(-40°C) / Z(+20°C)	Size B6 & C6	17	12	9	7	5	4	4																																				
	Size D6 & D8	15	10	8	6	4	3	3																																				
Load Life	The following specifications shall be satisfied when the capacitors are restored to +20°C after subjecting them to the DC rated voltage for 2,000 hours at +85°C. Polarization shall be reversed every 250 hours. The sum of DC voltage and peak AC voltage must not exceed the full rated voltage of the capacitors.  Capacitance change: Size B6 & C6 : ≤ ± 25% of the initial measured value Size D6 & D8 : ≤ ± 20% of the initial measured value Tan δ (DF) : ≤ 200% of the initial specified value Leakage current : ≤ initial specified value																																											
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to +20°C after exposing them for 500 hours at +85°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements.  Capacitance change: ≤ ± 15% of the initial measured value Tan δ (DF) : ≤ 150% of the initial specified value Leakage current : ≤ initial specified value																																											
Others	Satisfies characteristic W of JIS C5141																																											

**Part Numbering System for MFBP Series** When ordering, always specify complete catalog number for MFBP Series.



### Horizontal Chip Lead Terminals

**FC Type (Standard)**

Figure 1

**FD Type (Special Order)**

Figure 2

Unit: mm

### Case Dimensions

Case Code	L+0.2 max.	W+0.2 max.	H+0.2 max.	P±0.3	Figure
B6	6.3	3.6	3.5	3.0	1 & 2
C6	6.3	4.1	4.0	3.5	
D6	6.3	4.6	4.5	4.0	
D8	8.3	4.6	4.5	4.0	

\*For mechanical support, copper paste coated and dried.

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### Recommended Solder Pad on PC Board

**Without Dummy Terminal (FC)**

Figure 3

**With Dummy Terminal (FD)**

Figure 4

For tape and reel packaging and reflow soldering conditions, refer to the beginning of the Surface Mount section.

### Solder Pad Dimensions

Case Code	W1	a	b	c	Figure
B6	3.6	1.0	1.2	1.65	3 & 4
C6	4.1	1.3	1.2	1.65	
D6	4.6	1.5	1.2	1.65	
D8	4.6	1.5	2.2	2.65	

## Standard Voltage Ratings - Surface Mount

Rated Voltage (WVDC)	Capacitance (µF)	Catalog Part Number	Nominal Case Size* H × L (mm)	Case Code	Maximum ESR (Ω) at +20°C, 120Hz	Maximum Ripple Current (mA rms) at +85°C, 120Hz
<b>4 Volts</b> 5 Volts Surge	6.8	MFBP4FC6R8MB6TP	3.5 × 6.3	B6	121.875	7.2
	10	MFBP4FC10RMC6TP	4 × 6.3	C6	82.875	9.5
	15	MFBP4FC15RMD6TP	4.5 × 6.3	D6	49.725	15
	22	MFBP4FC22RMD8TP	4.5 × 8.3	D8	33.903	19
<b>6.3 Volts</b> 8 Volts Surge	3.3	MFBP6.3FC3R3MB6TP	3.5 × 6.3	B6	175.795	6.2
	4.7	MFBP6.3FC4R7MB6TP	3.5 × 6.3	B6	123.431	7.4
	6.8	MFBP6.3FC6R8MC6TP	4 × 6.3	C6	85.313	9.8
	10	MFBP6.3FC10RMD6TP	4.5 × 6.3	D6	53.04	14
	15	MFBP6.3FC15RMD8TP	4.5 × 8.3	D8	35.36	18
<b>10 Volts</b> 13 Volts Surge	3.3	MFBP10FC3R3MB6TP	3.5 × 6.3	B6	150.682	6.9
	4.7	MFBP10FC4R7MC6TP	4 × 6.3	C6	105.798	9
	6.8	MFBP10FC6R8MD6TP	4.5 × 6.3	D6	63.375	13
	10	MFBP10FC10RMD8TP	4.5 × 8.3	D8	43.095	16
<b>16 Volts</b> 20 Volts Surge	2.2	MFBP16FC2R2MB6TP	3.5 × 6.3	B6	195.886	6.1
	3.3	MFBP16FC3R3MC6TP	4 × 6.3	C6	130.591	8.2
	4.7	MFBP16FC4R7MD6TP	4.5 × 6.3	D6	84.638	12
	6.8	MFBP16FC6R8MD8TP	4.5 × 8.3	D8	58.5	15
<b>25 Volts</b> 32 Volts Surge	1.5	MFBP25FC1R5MB6TP	3.5 × 6.3	B6	265.2	5.3
	2.2	MFBP25FC2R2MC6TP	4 × 6.3	C6	180.818	7
	3.3	MFBP25FC3R3MD6TP	4.5 × 6.3	D6	110.5	10
	4.7	MFBP25FC4R7MD8TP	4.5 × 8.3	D8	77.585	13.3

\*Refer to diagrams for detailed case size dimensions.

# MFBP Series

## Standard Voltage Ratings - Surface Mount

Rated Voltage (WVDC)	Capacitance (μF)	Catalog Part Number	Nominal Case Size* H × L (mm)	Case Code	Maximum ESR (Ω) at +20°C, 120Hz	Maximum Ripple Current (mA rms) at +85°C, 120Hz
<b>35 Volts</b> 44 Volts Surge	1.0	MFBP35FC1R0MB6TP	3.5 × 6.3	B6	364.65	4.6
	1.5	MFBP35FC1R5MC6TP	4 × 6.3	C6	243.1	6.1
	2.2	MFBP35FC2R2MD6TP	4.5 × 6.3	D6	150.682	9.1
	3.3	MFBP35FC3R3MD8TP	4.5 × 8.3	D8	100.455	12
<b>50 Volts</b> 63 Volts Surge	0.1	MFBP50FCR10MB6TP	3.5 × 6.3	B6	3,646.5	1.3
	0.15	MFBP50FCR15MB6TP	3.5 × 6.3	B6	2,431.0	1.9
	0.22	MFBP50FCR22MB6TP	3.5 × 6.3	B6	1,657.5	2.3
	0.33	MFBP50FCR33MB6TP	3.5 × 6.3	B6	1,105.0	2.8
	0.47	MFBP50FCR47MB6TP	3.5 × 6.3	B6	775.851	3.3
	0.68	MFBP50FCR68MB6TP	3.5 × 6.3	B6	536.25	4.0
	1.0	MFBP50FC1R0MC6TP	4 × 6.3	C6	364.65	5.3
	1.5	MFBP50FC1R5MD6TP	4.5 × 6.3	D6	221.0	7.5
2.2	MFBP50FC2R2MD8TP	4.5 × 8.3	D8	150.682	10	

\* Refer to diagrams for detailed case size dimensions.