

**Type 704M  
Axial Lead  
Round Profile  
Metallized Polypropylene  
Film Capacitors**



### Specifications

**Capacitance Range:**

1.0 to 20.0  $\mu$ F  
(additional values available upon request)

**Capacitance Tolerance:**

$\pm 5\%$  and  $\pm 10\%$ , standard  
(tighter tolerances available upon request)

**Voltage Rating:**

200 VDC/140 VAC

**Operating Temperature**

Units may be operated at full rated voltage from  $-55^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ .

**Voltage De-rating above  $+85^{\circ}\text{C}$ :**

Units may be operated up to a maximum of  $+105^{\circ}\text{C}$  provided the voltage is de-rated linearly to 50% of the  $+85^{\circ}\text{C}$  rating.

**Lead Wire (d):**

Tinned Copper.  
0.032 (0.8) diameter (#20 AWG)

**Dissipation Factor:**

0.1% Maximum @ 1 KHz,  $+25^{\circ}\text{C}$ .

**Insulation Resistance (measured at 100 VDC):**

At  $+25^{\circ}\text{C}$ : 200,000  $M\Omega$ -  
 $\mu$ F At  $+85^{\circ}\text{C}$ : 10,000  $M\Omega$ -  
 $\mu$ F

(These are minimum ratings, call us if you have a more demanding requirement)

**Encapsulation:**

Wrapped with flame retardant polyester tape (meets UL510 specifications) and potted with flame retardant epoxy (meets UL94V-0 specifications).

**Dielectric/Construction:**

Metallized Polypropylene film, single section design. Non-Inductively wound.

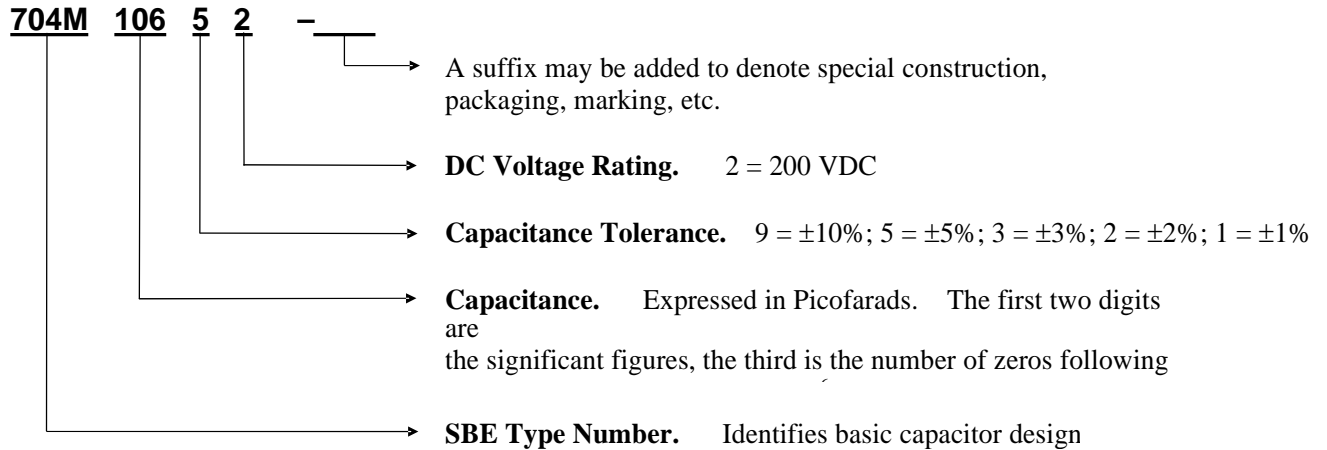
**High End Audio Applications:**

Amplifiers, Preamps, Crossover Networks. Polypropylene's low dissipation factor, ESR and dielectric absorption, along with long term capacitance stability over time make the 704M series ideal for high

In addition to the information provided here SBE also offers complete design and manufacturing of specific capacitance values, custom form factors, special lead terminations, etc.

Dimensions are in inches, millimeters are in parenthesis.

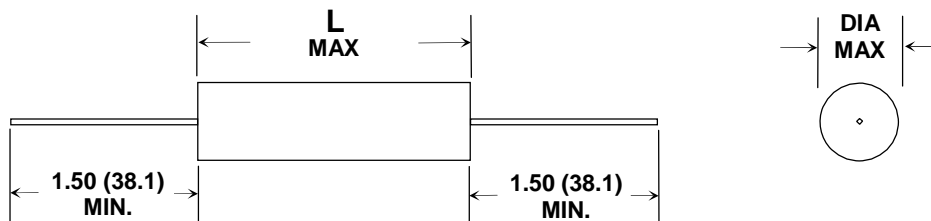
**Ordering/Part Number Information**



**Standard Marking Format**

Sample Marking on unit	Description	Tolerance codes per EIA standards
SBE 704M	SBE - SB Electronics Identification	F    ±1%
106J 200V	704M - Type Number.	G    ±2%
0510	200V - DC Voltage Rating	H    ±3%
	106J - Capacitance and Tolerance Code	J    ±5%
	0510 - Weekly Date Code (i.e. 10th week of 2005)	K    ±10%

**Dimension Outline**



**Lead Wire Size and Additional Termination Options**

Standard lead wire size is 0.032 (0.8) diameter (#20 AWG), Solid tinned copper wire. We can also provide a variety of other wire sizes and material (i.e. heavier gauges, insulated wire, tinned copper-clad steel, smaller gauges, etc.). If the wire size or material doesn't meet your requirements please contact us. We can accommodate your needs.

## Type 704M Sizes and Ratings – 200 VDC/140 VAC

Cap ( $\mu$ F)	Base Part # <sup>1</sup>	L MAX	DIA MAX	dV/dt <sup>2</sup> V/ $\mu$ sec	*ESR-m $\wedge$ @100KHz
1.0	704M10552	1.50 (38.1)	0.37 (9.4)	7	30.9
1.2	704M12552	1.50 (38.1)	0.40 (10.2)	8	25.9
1.5	704M15552	1.50 (38.1)	0.44 (11.2)	11	20.9
1.8	704M18552	1.50 (38.1)	0.48 (12.2)	11	17.5
2.0	704M20552	1.50 (38.1)	0.50 (12.7)	11	15.9
2.2	704M22552	1.50 (38.1)	0.52 (13.2)	11	14.5
2.5	704M25552	1.50 (38.1)	0.55 (14.0)	11	12.9
2.7	704M27552	1.50 (38.1)	0.57 (14.5)	11	12.1
3.0	704M30552	1.50 (38.1)	0.60 (15.2)	11	11.0
3.3	704M33552	1.50 (38.1)	0.63 (16.0)	11	10.1
3.6	704M36552	1.50 (38.1)	0.65 (16.5)	11	9.4
3.9	704M39552	1.50 (38.1)	0.68 (17.3)	11	8.8
4.0	704M40552	1.50 (38.1)	0.69 (17.5)	11	8.6
4.7	704M47552	1.50 (38.1)	0.74 (18.8)	11	7.5
5.0	704M50552	1.50 (38.1)	0.76 (19.3)	11	7.2
5.6	704M56552	1.50 (38.1)	0.80 (20.3)	12	6.6
6.0	704M60552	1.50 (38.1)	0.83 (21.1)	12	6.3
6.8	704M68552	1.50 (38.1)	0.88 (22.4)	12	5.7
7.0	704M70552	1.50 (38.1)	0.89 (22.6)	12	5.6
7.5	704M75552	1.50 (38.1)	0.92 (23.4)	12	5.4
8.0	704M80552	1.50 (38.1)	0.95 (24.1)	12	5.2
9.0	704M90552	1.50 (38.1)	1.01 (25.7)	12	4.8
10.0	704M10652	1.50 (38.1)	1.06 (26.9)	12	4.6
11.0	704M11652	1.50 (38.1)	1.11 (28.2)	12	4.4
12.0	704M12652	1.50 (38.1)	1.16 (29.5)	12	4.2
13.0	704M13652	1.50 (38.1)	1.20 (30.5)	12	4.1
14.0	704M14652	1.50 (38.1)	1.24 (31.5)	12	4.0
15.0	704M15652	1.50 (38.1)	1.29 (32.8)	12	3.9
16.0	704M16652	1.50 (38.1)	1.33 (33.8)	12	3.8
17.0	704M17652	1.50 (38.1)	1.37 (34.8)	12	3.8
18.0	704M18652	1.50 (38.1)	1.41 (35.8)	12	3.7
19.0	704M19652	1.50 (38.1)	1.44 (36.6)	12	3.7
20.0	704M20652	1.50 (38.1)	1.48 (37.6)	12	3.7

<sup>1</sup> Please refer to Ordering/Part Number page for specific part numbering details.<sup>2</sup> Please contact us for additional details regarding current carrying capability.

\* ESR ratings listed are Maximum. Please contact us for additional ESR data.

## General Specifications

The 704M series is designed and manufactured for use in demanding audio applications where the highest quality, most reliable film capacitor is required. They are non-inductively wound using the most reliable metallized polypropylene film available.

With complete design and manufacturing operations located at our Barre, Vermont facility, SBE's staff can provide the expertise needed to support your application, be it with a standard product found here, or a tailor designed part specific for your requirement. Regardless, SBE designs and manufactures film capacitors to outlast the products they are installed in. If you are in need of any further technical specifications or require any application assistance we will be pleased to assist you.

### Operating Temperature Range:

Standard operating temperature range is  $-55^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ . Units may be operated at the full rated voltage within this temperature range.

The 704M series may be operated up to a maximum temperature of  $+105^{\circ}\text{C}$ , however the voltage must be linearly de-rated to 50% of the full rated voltage at  $+105^{\circ}\text{C}$ .

### Dielectric Withstanding Voltage:

Units shall withstand a DC potential of 200% of rated voltage applied between terminals for not more than 2 minutes.

### Lead Bend Test:

After 3 consecutive  $180^{\circ}$  bends. No damage.

### Lead Pull Test:

5 pounds (2.3 Kg) for one minute on lead axis. No damage.

### Humidity Testing:

Units subjected to 95% relative humidity for 250 hours with no voltage applied at  $+40^{\circ}\text{C}$ . After 4 hours of drying, minimum product of insulation resistance and capacitance shall be  $40,000\text{ M}\Omega\cdot\text{F}$ , but need not exceed  $80,000\text{ M}\Omega$  at  $+25^{\circ}\text{C}$ .

### DC Voltage Life Test:

1000 hours at  $+85^{\circ}\text{C}$  at 150% of rated voltage. After test; capacitance shall not have changed by more than  $\pm 2\%$  of initial value, insulation resistance shall not have decreased by more than 50% of initial value and dissipation factor shall not have increased to more than 0.1%. In addition, there shall be no open or short circuits, and no sign of visible damage.

### AC Voltage Life Test:

Minimum of 1000 hours at  $+85^{\circ}\text{C}$  at 60 Hz. AC test voltage applied at 110% of rated AC voltage. After test; capacitance shall not have changed by more than  $\pm 5\%$  of initial value, insulation resistance shall not have decreased by more than 50% of initial value and dissipation factor shall not have changed by more than 0.03%. In addition, there shall be no open or short circuits, and no sign of visible damage. All measurements made at 1 KHz.

### Dielectric Material/Construction:

The 704M series is manufactured using metallized polypropylene film as the dielectric. The capacitor element is non-inductively wound in a single section design.

Metallized polypropylene film utilizes a base film of polypropylene with a thin layer of aluminum vacuum deposited directly on the film as the electrode.

Metallized film exhibits a characteristic called "self-healing" or "self-clearing", which is the ability to remove a fault or short circuit in the dielectric film by vaporizing (from high current density) the metallization near the defect. The metallization is so thin that negligible film damage occurs during the clearing process. The vaporized metal oxidizes over time, aiding in the isolation of a fault area.

### Additional Testing Notes:

Since it is not possible to list every detail of testing we perform we strongly encourage you to contact us with any specific question or