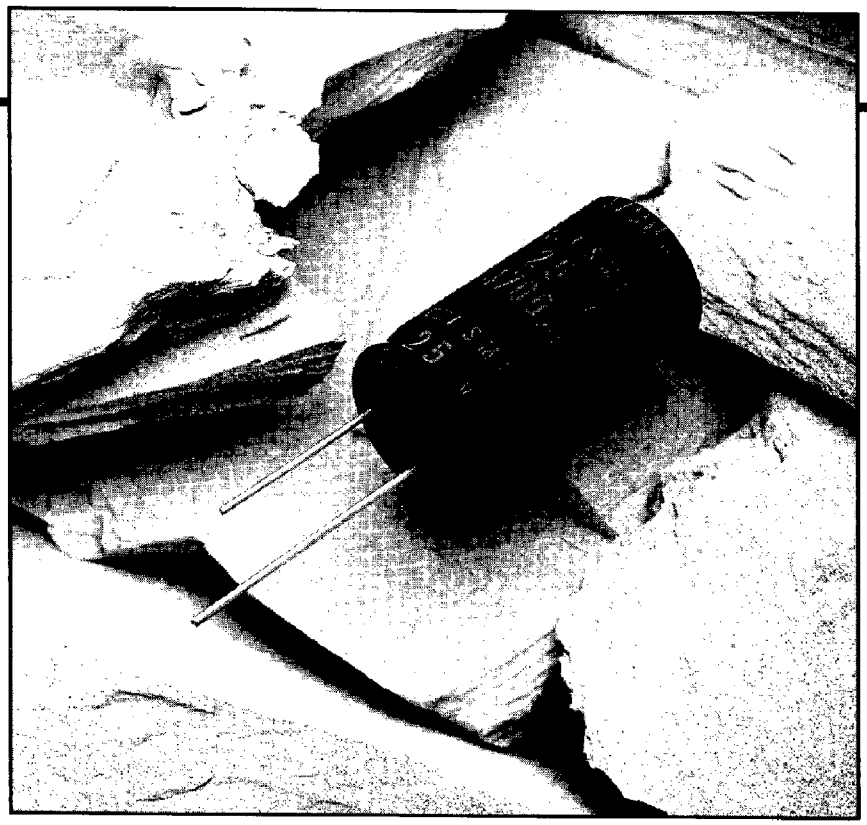
SME Series

UNITED CHEMI-CON

- Miniature
- General Purpose
- Solvent Proof
- +85°C Maximum Temperature



The SME series capacitors are our standard general purpose capacitors. These radial lead capacitors are available in a wide range of voltage and capacitance ratings and are designed for a load life of 2,000 hours at 85°C with an operating temperature range of −40°C to +85°C.

The SME series capacitors, *except for those rated at 350-450 volts*, 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

- **Radial lead terminals.**
- **Capacitance range: 0.1 to 15,000μF.**
- **Voltage range: 6.3 to 450VDC.**
- **Operating temperature range: −40°C to +85°C for 6.3 to 400VDC; −25°C to +85°C for 450VDC.**
- **Leakage current: See specifications table for leakage current values at +20°C.**
- **Standard capacitance tolerance: ±20%**
- **Nominal case size (D×L): 5×11mm to 18×40mm.**
- **Rated lifetime: 2,000 hours at +85°C.**

SME Series

SME Specifications

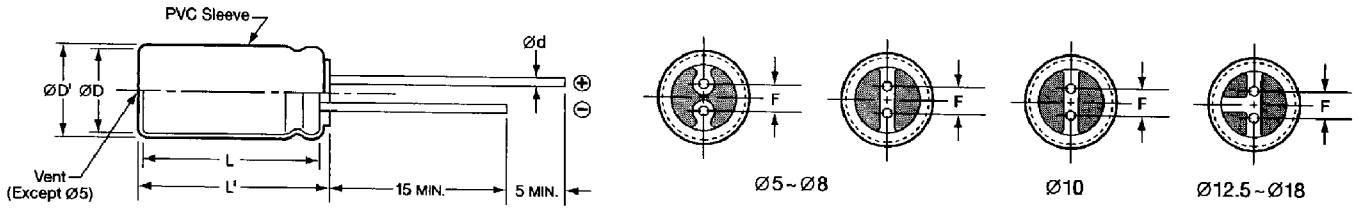
<table>
<tr><th>Item</th><th>Characteristics</th></tr>
<tr><td>Operating Temperature Range</td><td>−40 to +85°C for 6.3 to 400 VDC; −25 to +85°C for 450 VDC</td></tr>
<tr><td>Rated Voltage Range</td><td>6.3 to 450VDC</td></tr>
<tr><td>Capacitance Range</td><td>0.1 to 15,000μF</td></tr>
<tr><td>Capacitance Tolerance</td><td>±20% (M) at +20°C, 120Hz</td></tr>
<tr><td>Leakage Current</td><td>At +20°C
<table>
<tr><th>DC Rated Voltage</th><th>Test Time</th><th colspan="2">Leakage Current (μA)</th></tr>
<tr><td rowspan="2">6.3-100V</td><td>After 1 minute</td><td colspan="2">I = 0.03CV or 4μA, whichever is greater.</td></tr>
<tr><td>After 2 minutes</td><td colspan="2">I = 0.01CV or 3μA, whichever is greater.</td></tr>
<tr><td rowspan="2">160-450V</td><td>After 1 minute</td><td>CV≤1,000: I = 0.1CV+40</td><td>CV>1,000: I = 0.04CV+100</td></tr>
<tr><td>After 5 minutes</td><td>CV≤1,000: I = 0.03CV+15</td><td>CV>1,000: I = 0.02CV+25</td></tr>
</table>
Where I = Leakage current (μA), C = Nominal capacitance (μF) and V = Rated voltage (V)</td></tr>
<tr><td>Dissipation Factor (Tan δ)</td><td>At +20°C, 120Hz
<table>
<tr><td>Rated Voltage (V)</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>100</td><td>160-250</td><td>350-450</td></tr>
<tr><td>Tan δ (DF)</td><td>0.22</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.09</td><td>0.08</td><td>0.20</td><td>0.24</td></tr>
</table>
When nominal capacitance exceeds 1,000μF, add 0.02 to the values above for each 1,000μF increase.</td></tr>
<tr><td>Low Temperature Characteristics</td><td>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>
<tr><td>Rated Voltage (V)</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50-100</td><td>160-250</td><td>350-400</td><td>450</td></tr>
<tr><td>Z(−25°C)/Z(+20°C)</td><td>4</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>3</td><td>6</td><td>16</td></tr>
<tr><td>Z(−40°C)/Z(+20°C)</td><td>8</td><td>6</td><td>4</td><td>3</td><td>3</td><td>3</td><td>4</td><td>6</td><td>–</td></tr>
</table></td></tr>
<tr><td>Ripple Current Multipliers
Refer to Section 4 of the Mini-Glossary for explanation of Ripple Current Multipliers.</td><td>Ambient Temperature (°C)
<table>
<tr><td>+70°C</td><td>+85°C</td></tr>
<tr><td>1.30</td><td>1.00</td></tr>
</table>
Frequency (Hz)
<table>
<tr><td>Capacitance (μF)</td><td>50Hz</td><td>120Hz</td><td>300Hz</td><td>1kHz</td><td>10kHz</td><td>100kHz</td></tr>
<tr><td>≤ 3.3μF</td><td>0.65</td><td>1.00</td><td>1.35</td><td>1.75</td><td>2.30</td><td>2.50</td></tr>
<tr><td>4.7-33μF</td><td>0.75</td><td>1.00</td><td>1.25</td><td>1.50</td><td>1.75</td><td>1.80</td></tr>
<tr><td>47-1000μF</td><td>0.80</td><td>1.00</td><td>1.15</td><td>1.30</td><td>1.40</td><td>1.50</td></tr>
<tr><td>≥ 2200μF</td><td>0.85</td><td>1.00</td><td>1.03</td><td>1.05</td><td>1.08</td><td>1.08</td></tr>
</table></td></tr>
<tr><td>Load Life</td><td>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. The sum of DC voltage and peak AC voltage must not exceed the full rated voltage of the capacitors.
Capacitance change: ≤ ±20% of initial measured value
Tan δ (DF) : ≤ 150% of initial specified value for 6.3-100V & 450V
: ≤ 200% of initial specified value for 160-400V
Leakage current : ≤ initial specified value</td></tr>
<tr><td>Shelf Life</td><td>The following specifications shall be satisfied when the capacitors are restored to +20°C after exposing them for 1,000 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: ≤ ±20% of initial measured value
Tan δ (DF) : ≤ 150% of initial specified value for 6.3-100V
: ≤ 200% of initial specified value for 160-450V
Leakage current : ≤ initial specified value for 6.3-100V
: ≤ 500% of initial specified value for 160-450V</td></tr>
<tr><td>Others</td><td>Satisfies characteristic W of JIS C5141</td></tr>
</table>

SME Series

Diagram of Dimensions

VB/Radial Lead

Unit: mm



Gas escape end seal for all case diameters.

For optional lead configurations and tape and ammo packaging, refer to the beginning of the Miniature section.

ØD	ØD' max.	L' max.	Ød	F±0.5
5	ØD+0.5	L+1.0	0.5	2.0
6.3	ØD+0.5	L+1.0	0.5	2.5
8	ØD+0.5	L+1.0	0.6	3.5
10, 12.5	ØD+0.5	L+1.0	0.6	5.0
16, 18	ØD+0.5	L+1.5	0.8	7.5

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

SME 25 VB 472 M 18X35 LL

- LL — Lead Length: LL is Standard.
- 18X35 — Case Code: See Case Sizes in Tables.
- M — Capacitance Tolerance: M = ±20%
- 472 — Capacitance Value: Expressed in microfarads. The first two digits are significant figures, and the third digit indicates the number of zeros for capacitance of 100µF or more. R indicates the decimal point for capacitance less than 100µF (e.g. R47 = .47µF; 4R7 = 4.7µF; 47R = 47µF; 471 = 470µF; 472 = 4,700µF; 473 = 47,000µF).
- VB — Lead Configuration: VB = Radial Lead.
- 25 — DC Rated Voltage: Expressed in Volts (e.g. 25 = 25WVDC).
- SME — Series Name: Indicates Basic Capacitor Design.

Standard Voltage Ratings - VB/Radial Lead

Rated Voltage (WVDC)	Capacitance (µF)	Catalog Part Number	Nominal Case Size* D×L (mm)	Maximum ESR (Ω) at +20°C, 120Hz	Maximum Ripple Current (mA rms) at +85°C, 120Hz
6.3 Volts 8 Volts Surge	33	SME6.3VB33RM5X11LL	5 × 11	11.05	55
	47	SME6.3VB47RM5X11LL	5 × 11	7.759	79
	100	SME6.3VB101M5X11LL	5 × 11	3.647	130
	220	SME6.3VB221M6X11LL	6.3 × 11	1.658	230
	330	SME6.3VB331M6X11LL	6.3 × 11	1.105	280
	470	SME6.3VB471M8X11LL	8 × 11.5	0.776	380
	1,000	SME6.3VB102M10X12LL	10 × 12.5	0.365	650
	2,200	SME6.3VB222M12X20LL	12.5 × 20	0.181	1,150
	3,300	SME6.3VB332M12X20LL	12.5 × 20	0.131	1,380
	4,700	SME6.3VB472M16X25LL	16 × 25	0.099	1,880
	6,800	SME6.3VB682M16X25LL	16 × 25	0.078	2,120
	10,000	SME6.3VB103M16X31LL	16 × 31.5	0.066	2,500
	15,000	SME6.3VB153M18X35LL	18 × 35.5	0.055	2,990

***The case sizes in table are with no sleeve, refer to diagram for case sizes with sleeve.**

SME Series

Standard Voltage Ratings - VB/Radial Lead

Rated Voltage (WVDC)	Capacitance (µF)	Catalog Part Number	Nominal Case Size* D×L (mm)	Maximum ESR (Ω) at +20°C, 120Hz	Maximum Ripple Current (mA rms) at +85°C, 120Hz
10 Volts 13 Volts Surge	22	SME10VB22RM5X11LL	5 × 11	14.315	59
	33	SME10VB33RM5X11LL	5 × 11	9.543	84
	47	SME10VB47RM5X11LL	5 × 11	6.701	100
	100	SME10VB101M5X11LL	5 × 11	3.149	145
	220	SME10VB221M6X11LL	6.3 × 11	1.431	250
	470	SME10VB471M8X11LL	8 × 11.5	0.67	415
	1,000	SME10VB102M10X16LL	10 × 16	0.315	790
	2,200	SME10VB222M12X20LL	12.5 × 20	0.158	1,240
	3,300	SME10VB332M12X25LL	12.5 × 25	0.116	1,590
	4,700	SME10VB472M16X25LL	16 × 25	0.088	1,980
	6,800	SME10VB682M16X31LL	16 × 31.5	0.071	2,390
	10,000	SME10VB103M18X35LL	18 × 35.5	0.061	2,840
16 Volts 20 Volts Surge	10	SME16VB10RM5X11LL	5 × 11	26.52	44
	22	SME16VB22RM5X11LL	5 × 11	12.055	75
	33	SME16VB33RM5X11LL	5 × 11	8.036	90
	47	SME16VB47RM5X11LL	5 × 11	5.643	110
	100	SME16VB101M6X11LL	6.3 × 11	2.652	180
	220	SME16VB221M8X11LL	8 × 11.5	1.205	300
	330	SME16VB331M8X11LL	8 × 11.5	0.804	370
	470	SME16VB471M10X12LL	10 × 12.5	0.564	520
	1,000	SME16VB102M10X20LL	10 × 20	0.265	910
	2,200	SME16VB222M12X25LL	12.5 × 25	0.136	1,420
	3,300	SME16VB332M16X25LL	16 × 25	0.10	1,840
	4,700	SME16VB472M16X31LL	16 × 31.5	0.078	2,260
	6,800	SME16VB682M18X35LL	18 × 35.5	0.063	2,690
	10,000	SME16VB103M18X40LL	18 × 40	0.056	2,920
25 Volts 32 Volts Surge	4.7	SME25VB4R7M5X11LL	5 × 11	49.372	31
	10	SME25VB10RM5X11LL	5 × 11	23.205	54
	22	SME25VB22RM5X11LL	5 × 11	10.548	80
	33	SME25VB33RM5X11LL	5 × 11	7.032	97
	47	SME25VB47RM5X11LL	5 × 11	4.937	115
	100	SME25VB101M6X11LL	6.3 × 11	2.321	190
	220	SME25VB221M8X11LL	8 × 11.5	1.055	320
	330	SME25VB331M10X12LL	10 × 12.5	0.703	470
	470	SME25VB471M10X16LL	10 × 16	0.494	620
	1,000	SME25VB102M12X20LL	12.5 × 20	0.232	1,090
	2,200	SME25VB222M16X25LL	16 × 25	0.121	1,660
	3,300	SME25VB332M16X31LL	16 × 31.5	0.09	2,070
	4,700	SME25VB472M18X35LL	18 × 35.5	0.071	2,520
	6,800	SME25VB682M18X40LL	18 × 40	0.059	2,830
35 Volts 44 Volts Surge	4.7	SME35VB4R7M5X11LL	5 × 11	42.319	40
	10	SME35VB10RM5X11LL	5 × 11	19.89	58
	22	SME35VB22RM5X11LL	5 × 11	9.041	87
	33	SME35VB33RM5X11LL	5 × 11	6.027	105
	47	SME35VB47RM6X11LL	6.3 × 11	4.232	145
	100	SME35VB101M8X11LL	8 × 11.5	1.989	240
	220	SME35VB221M10X12LL	10 × 12.5	0.904	420
	330	SME35VB331M10X16LL	10 × 16	0.603	570
	470	SME35VB471M10X20LL	10 × 20	0.423	740
	1,000	SME35VB102M12X25LL	12.5 × 25	0.199	1,300
	2,200	SME35VB222M16X31LL	16 × 31.5	0.105	1,890
	3,300	SME35VB332M18X35LL	18 × 35.5	0.08	2,340
	4,700	SME35VB472M18X40LL	18 × 40	0.063	2,690

***The case sizes in table are with no sleeve, refer to diagram for case sizes with sleeve.**

SME Series

Standard Voltage Ratings - VB/Radial Lead

Rated Voltage (WVDC)	Capacitance (µF)	Catalog Part Number	Nominal Case Size* D×L (mm)	Maximum ESR (Ω) at +20°C, 120Hz	Maximum Ripple Current (mA rms) at +85°C, 120Hz
50 Volts 63 Volts Surge	0.1	SME50VBR10M5X11LL	5 × 11	1,657.5	1.3
	0.22	SME50VBR22M5X11LL	5 × 11	753.409	2.9
	0.33	SME50VBR33M5X11LL	5 × 11	502.273	4.4
	0.47	SME50VBR47M5X11LL	5 × 11	352.66	11
	1.0	SME50VB1R0M5X11LL	5 × 11	165.75	17
	2.2	SME50VB2R2M5X11LL	5 × 11	75.341	29
	3.3	SME50VB3R3M5X11LL	5 × 11	50.227	35
	4.7	SME50VB4R7M5X11LL	5 × 11	35.266	42
	10	SME50VB10RM5X11LL	5 × 11	16.575	65
	22	SME50VB22RM5X11LL	5 × 11	7.534	95
	33	SME50VB33RM6X11LL	6.3 × 11	5.023	125
	47	SME50VB47RM6X11LL	6.3 × 11	3.527	150
	100	SME50VB101M8X11LL	8 × 11.5	1.658	255
	220	SME50VB221M10X16LL	10 × 16	0.753	490
	330	SME50VB331M10X20LL	10 × 20	0.502	650
	470	SME50VB471M12X20LL	12.5 × 20	0.353	860
	1,000	SME50VB102M16X25LL	16 × 25	0.166	1,530
	2,200	SME50VB222M18X35LL	18 × 35.5	0.09	2,160
63 Volts 79 Volts Surge	4.7	SME63VB4R7M5X11LL	5 × 11	31.739	45
	10	SME63VB10RM5X11LL	5 × 11	14.918	70
	22	SME63VB22RM6X11LL	6.3 × 11	6.781	115
	33	SME63VB33RM6X11LL	6.3 × 11	4.52	140
	47	SME63VB47RM8X11LL	8 × 11.5	3.174	190
	100	SME63VB101M10X12LL	10 × 12.5	1.492	320
	220	SME63VB221M10X20LL	10 × 20	0.678	565
	330	SME63VB331M12X20LL	12.5 × 20	0.452	765
	470	SME63VB471M12X25LL	12.5 × 25	0.317	990
	1,000	SME63VB102M16X31LL	16 × 31.5	0.149	1,700
100 Volts 125 Volts Surge	0.1	SME100VBR10M5X11LL	5 × 11	1,326.0	2.6
	0.22	SME100VBR22M5X11LL	5 × 11	602.727	5.8
	0.33	SME100VBR33M5X11LL	5 × 11	401.818	8.8
	0.47	SME100VBR47M5X11LL	5 × 11	282.128	12
	1.0	SME100VB1R0M5X11LL	5 × 11	132.6	22
	2.2	SME100VB2R2M5X11LL	5 × 11	60.273	33
	3.3	SME100VB3R3M5X11LL	5 × 11	40.182	40
	4.7	SME100VB4R7M5X11LL	5 × 11	28.213	48
	10	SME100VB10RM6X11LL	6.3 × 11	13.26	80
	22	SME100VB22RM8X11LL	8 × 11.5	6.027	135
	33	SME100VB33RM10X12LL	10 × 12.5	4.018	195
	47	SME100VB47RM10X16LL	10 × 16	2.821	255
	100	SME100VB101M12X20LL	12.5 × 20	1.326	450
	220	SME100VB221M16X25LL	16 × 25	0.603	810
	330	SME100VB331M16X25LL	16 × 25	0.402	990
	470	SME100VB471M16X31LL	16 × 31.5	0.282	1,250
160 Volts 200 Volts Surge	0.47	SME160VBR47M6X11LL	6.3 × 11	705.319	12
	1.0	SME160VB1R0M6X11LL	6.3 × 11	331.5	17
	2.2	SME160VB2R2M6X11LL	6.3 × 11	150.682	26
	3.3	SME160VB3R3M8X11LL	8 × 11.5	100.455	36
	4.7	SME160VB4R7M8X11LL	8 × 11.5	70.532	44
	10	SME160VB10RM10X16LL	10 × 16	33.15	83
	22	SME160VB22RM10X20LL	10 × 20	15.068	130
	33	SME160VB33RM12X20LL	12.5 × 20	10.045	180
	47	SME160VB47RM12X25LL	12.5 × 25	7.053	230
	100	SME160VB101M16X25LL	16 × 25	3.315	380
	220	SME160VB221M18X35LL	18 × 35.5	1.507	640

*The case sizes in table are with no sleeve, refer to diagram for case sizes with sleeve.

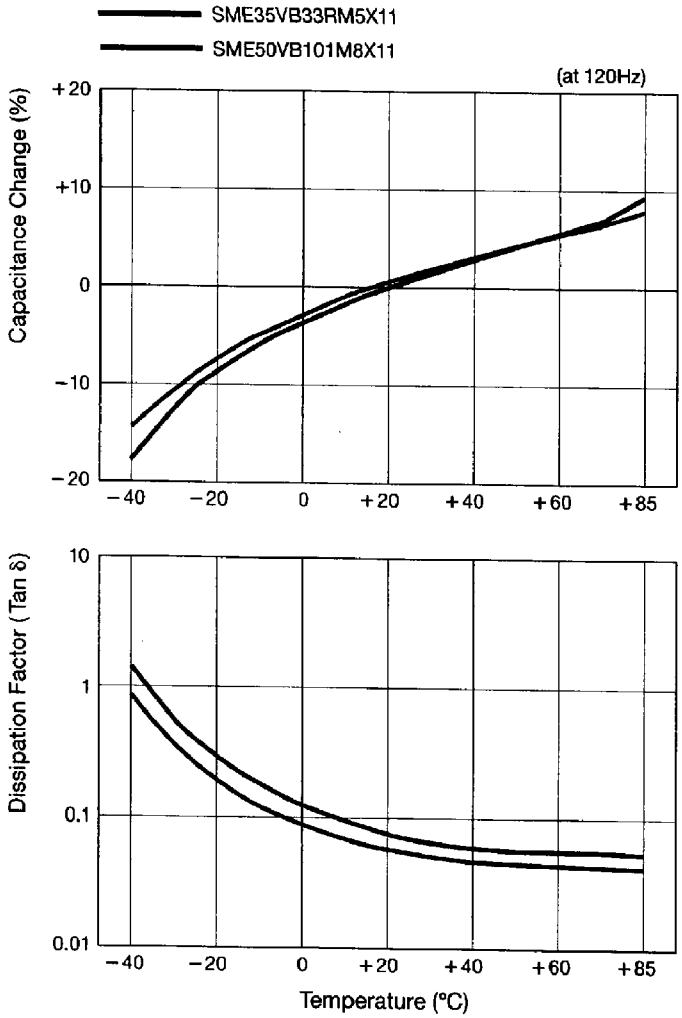
SME Series

Standard Voltage Ratings - VB/Radial Lead

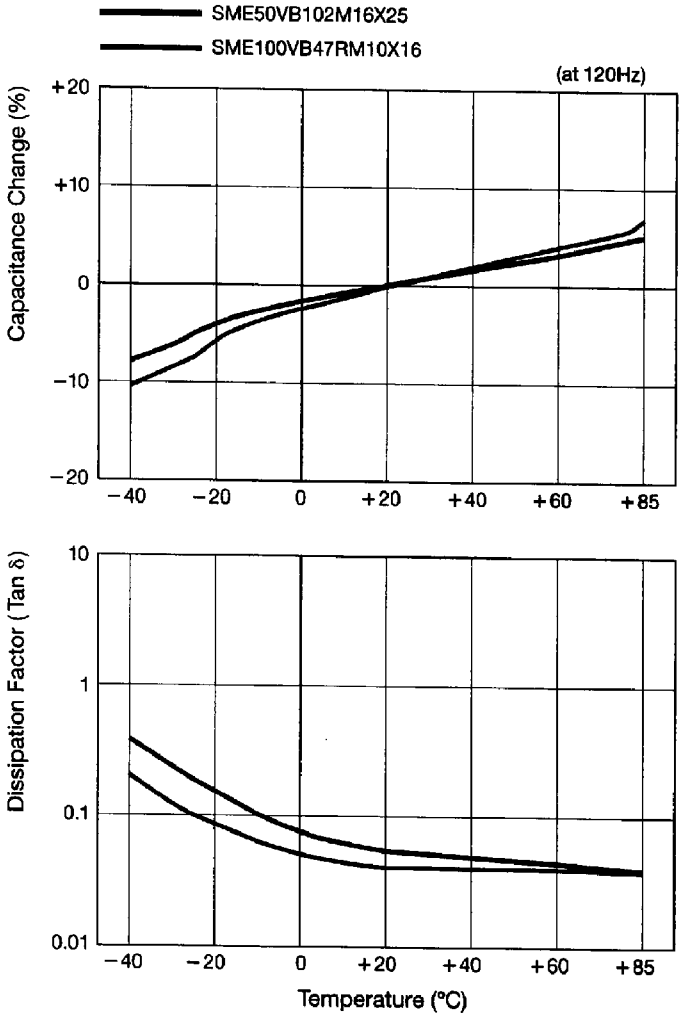
Rated Voltage (WVDC)	Capacitance (µF)	Catalog Part Number	Nominal Case Size* D×L (mm)	Maximum ESR (Ω) at +20°C, 120Hz	Maximum Ripple Current (mA rms) at +85°C, 120Hz
200 Volts 250 Volts Surge	0.47	SME200VBR47M6X11LL	6.3 × 11	705.319	12
	1.0	SME200VB1R0M6X11LL	6.3 × 11	331.5	17
	2.2	SME200VB2R2M6X11LL	6.3 × 11	150.682	26
	3.3	SME200VB3R3M8X11LL	8 × 11.5	100.455	36
	4.7	SME200VB4R7M10X12LL	10 × 12.5	70.532	51
	10	SME200VB10RM10X16LL	10 × 16	33.15	83
	22	SME200VB22RM10X20LL	10 × 20	15.068	130
	33	SME200VB33RM12X25LL	12.5 × 25	10.045	190
	47	SME200VB47RM12X25LL	12.5 × 25	7.053	230
	100	SME200VB101M16X31LL	16 × 31.5	3.315	400
	220	SME200VB221M18X40LL	18 × 40	1.507	660
250 Volts 300 Volts Surge	0.47	SME250VBR47M6X11LL	6.3 × 11	705.319	12
	1.0	SME250VB1R0M6X11LL	6.3 × 11	331.5	17
	2.2	SME250VB2R2M8X11LL	8 × 11.5	150.682	30
	3.3	SME250VB3R3M10X12LL	10 × 12.5	100.455	43
	4.7	SME250VB4R7M10X12LL	10 × 12.5	70.532	51
	10	SME250VB10RM10X20LL	10 × 20	33.15	90
	22	SME250VB22RM12X25LL	12.5 × 25	15.068	160
	33	SME250VB33RM12X25LL	12.5 × 25	10.045	190
	47	SME250VB47RM16X25LL	16 × 25	7.053	260
	100	SME250VB101M18X35LL	18 × 35.5	3.315	440
350 Volts 400 Volts Surge Not Solvent Proof	0.47	SME350VBR47M8X11LL	8 × 11.5	846.383	15
	1.0	SME350VB1R0M8X11LL	8 × 11.5	397.8	22
	2.2	SME350VB2R2M10X12LL	10 × 12.5	180.818	39
	3.3	SME350VB3R3M10X16LL	10 × 16	120.545	53
	4.7	SME350VB4R7M10X16LL	10 × 16	84.638	63
	10	SME350VB10RM12X20LL	12.5 × 20	39.78	115
	22	SME350VB22RM12X25LL	12.5 × 25	18.082	180
	33	SME350VB33RM16X25LL	16 × 25	12.055	245
	47	SME350VB47RM16X31LL	16 × 31.5	8.464	315
	100	SME350VB101M18X40LL	18 × 40	3.978	500
400 Volts 450 Volts Surge Not Solvent Proof	1.0	SME400VB1R0M8X11LL	8 × 11.5	397.8	22
	2.2	SME400VB2R2M10X12LL	10 × 12.5	180.818	39
	3.3	SME400VB3R3M10X16LL	10 × 16	120.545	53
	4.7	SME400VB4R7M10X20LL	10 × 20	84.638	69
	10	SME400VB10RM12X20LL	12.5 × 20	39.78	115
	22	SME400VB22RM16X25LL	16 × 25	18.082	200
	33	SME400VB33RM16X31LL	16 × 31.5	12.055	265
	47	SME400VB47RM16X35LL	16 × 35.5	8.464	325
450 Volts 500 Volts Surge Not Solvent Proof	1.0	SME450VB1R0M10X12LL	10 × 12.5	397.8	25
	2.2	SME450VB2R2M10X16LL	10 × 16	180.818	42
	3.3	SME450VB3R3M10X20LL	10 × 20	120.545	56
	4.7	SME450VB4R7M12X20LL	12.5 × 20	84.638	75
	10	SME450VB10RM12X25LL	12.5 × 25	39.78	120
	22	SME450VB22RM16X31LL	16 × 31.5	18.082	210
	33	SME450VB33RM18X35LL	18 × 35.5	12.055	275

***The case sizes in table are with no sleeve, refer to diagram for case sizes with sleeve.**

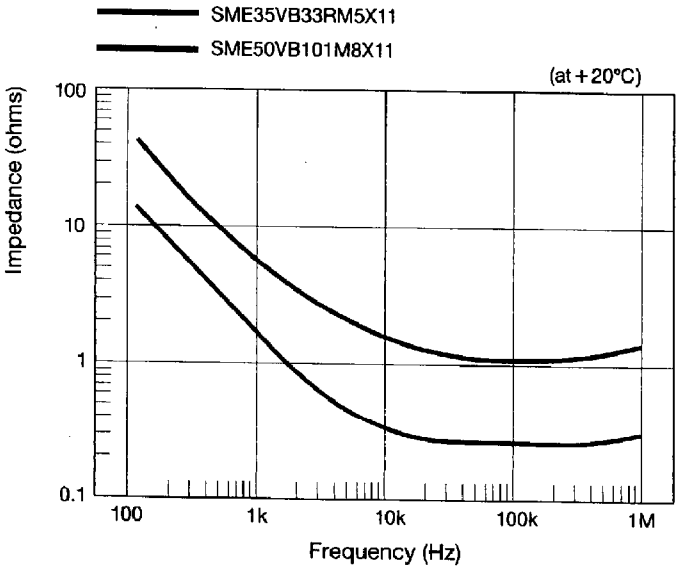
Temperature Characteristics



Temperature Characteristics



Impedance – Frequency Characteristics



Impedance – Frequency Characteristics