# SFE, SFR

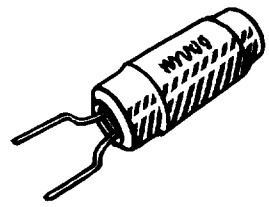
## Polystyrene capacitor with radial leads

### Construction

Polystyrene film with metal foil electrodes and radial tinned wires. Wound to a compact cylindrical form.
SFE is coated with an epoxy resin for extended operating temperature range.

### Typical applications

Tuned circuits, filters and applications where a very low dissipation factor is required.



### Specifications

| | | |
|---|---|---|
| **Temperature range** | Operating: | −40 ... +85°C (SFE)<br>−10 ... +70°C (SFR) |
| **Climatic category** | DIN 40040, 2.73, GPG (SFE) | −40 ... +85°C<br>Average relative humidity ≤ 65 %<br>RH = 85 % for 60 days per year<br>RH = 75 % for further days limited by average value per year. |
| | DIN 40040, 2.73, JSG (SFR) | −10 ... +70°C<br>Average relative humidity ≤ 65 %<br>RH = 85 % for 60 days per year.<br>RH = 75 % for further days limited by average value per year. |
| **Long term stability** | | Maximum capacitance drift ± (0.3 % +0.4 pF) after a storage of 2 years within the operating temperature range. |

### Maximum AC voltage

The AC voltage must not exceed the following limits:

| | | |
|---|---|---|
| For 50 & 63 V | | $U_{AC} = 0.4 \times U_{DC}$ |
| For 125 V & 160 V | L ≤ 10 mm | $U_{AC} = 0.4 \times U_{DC}$ |
| | L < 10 mm | $U_{AC} = 0.3 \times U_{DC}$ |

With DC bias, the sum of the DC voltage and the peak value of the AC voltage must not exceed the rated DC voltage.

### Capacitance and rated voltage

Capacitance measured at 23°C.
f = 100 kHz for C ≤ 10000 pF and
f = 1 kHz for C > 1000 pF.

| | | |
|---|---|---|
| 100 ... 10000 pF | 50/ 63 $V_{DC}$ | 20/25 $V_{AC}$ |
| 100 ... 2800 pF | 125/160 $V_{AC}$ | 50/63 $V_{AC}$ |
| 2801 ... 6800 pF | 125/160 $V_{AC}$ | 40/50 $V_{AC}$ |

### General

**Test voltage**

2.5 × $U_R$ during 2 seconds

**Available capacitance tolerance**

±20 %, ±10 %, ±5 %, ±2.5 %, ±2 %, ±1 %, but not less than ±1 pF.

**Temperature coefficient (at 1 kHz)**

−150 ±50 ppm/°C

**Humidity coefficient**

Measured at 20°C for 50 ... 85 % relative humidity 60 ... 200 ppm/1 % change of RH

**High frequency load**

$I_{max}$ = 0.3 A for L ≤ 10 mm
0.7 A for L > 10 mm

**Self-inductance**

Approximately 10 nH/cm for the total length of the lead and capacitor winding.

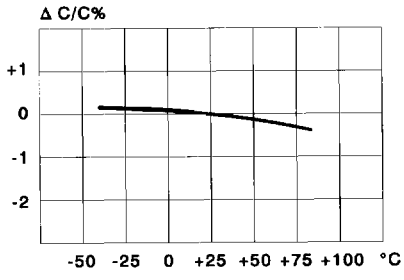
## Dissipation factor tanδ ( at + 23°C)

| | | | | | | |
|---|---|---|---|---|---|---|
| | C ≤ 1000 | pF | max. | $1 \times 10^{-3}$ at | 1 | kHz |
| 1000 pF | < C ≤ 10000 | pF | max. | $0.3 \times 10^{-3}$ at | 10 | kHz |
| 4700 pF | < C ≤ 10000 | pF | max. | $0.5 \times 10^{-3}$ at | 100 | kHz |

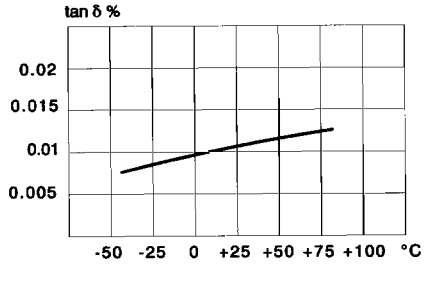
## Insulation resistance

Series 50 and 63 $V_{DC}$ > $10^4$ MΩ
Series 125 and 160 $V_{DC}$ > $10^5$ MΩ

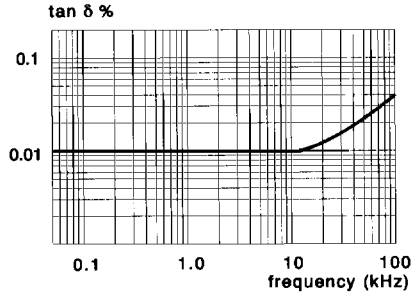
**Capacitance vs. temperature (at 1 KHz)**



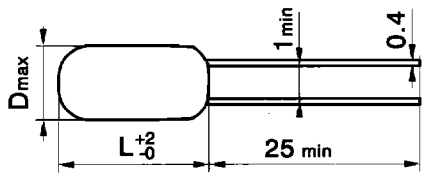

**Dissipation factor vs. temperature (at 1 KHz)**



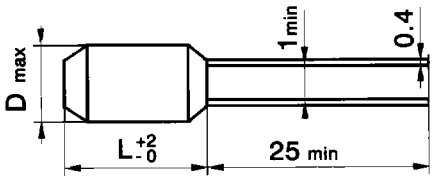

**Dissipation factor vs. frequency (at + 23°C)**




**SFE**




**SFR**




## SFE — Maximum dimensions (mm)

| Capacitance (pF) | Rated voltage $V_{DC}$ 50, 63 D | L | 125, 160 D | L |
|---|---|---|---|---|
| 100 ... 200 | 6.0 | 12 | 6.5 | 12 |
| 201 ... 1000 | 6.5 | 12 | 7.0 | 12 |
| 1001 ... 2000 | 7.0 | 12 | 8.0 | 12 |
| 2001 ... 2800 | 7.5 | 12 | 9.0 | 12 |
| 2801 ... 4700 | 8.0 | 12 | 8.5 | 17 |
| 4701 ... 6800 | 7.5 | 17 | 9.5 | 17 |
| 6801 ... 8200 | 8.0 | 17 | | |
| 8201 ... 10000 | 8.5 | 17 | | |

## SFR — Maximum dimensions (mm)

| Capacitance (pF) | Rated voltage $V_{DC}$ 50, 63 D | L | 125, 160 D | L |
|---|---|---|---|---|
| 100 ... 200 | 5.5 | 10 | 5.5 | 10 |
| 201 ... 1000 | 6.0 | 10 | 6.0 | 10 |
| 1001 ... 2000 | 6.5 | 10 | 7.0 | 10 |
| 2001 ... 2800 | 7.0 | 10 | 8.5 | 10 |
| 2801 ... 4700 | 7.5 | 10 | 7.5 | 15 |
| 4701 ... 6800 | 7.0 | 15 | 8.5 | 15 |
| 6801 ... 8200 | 7.5 | 15 | | |
| 8201 ... 10000 | 8.0 | 15 | | |

## Marking

Capacitance, tolerance and voltage are marked on the capacitors.

**Tolerance code:**

M = ± 20 %, K = ± 10 %, J = ± 5 %, H = ± 2.5 %,
G = ± 2 %, F = ± 1 % or 1 pF

**Voltage code:**

Plain = 50 & 63 $V_{DC}$, red = 125 & 160 $V_{DC}$