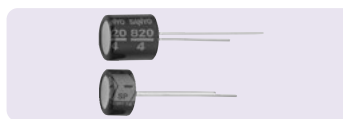


## SP Series



High capacitance ¥ Low ESR  
Optimum for Audio etc.

The characteristics of SP series are large capacitance (about 2times of previous value) and low ESR (about half of previous value). It is optimum to use around MPU of computer equipment. Also, suitable for audio because OFC is used as the lead wires. Lead free-flow is supported.

SC  
(Standard)

SP  
High capacitance  
Low ESR

### Specifications

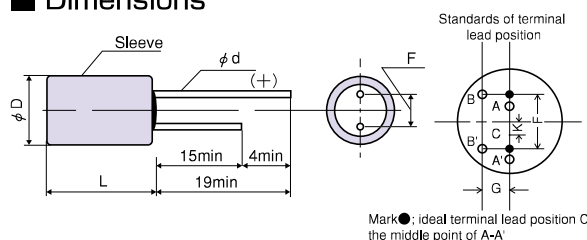
Items	Condition			Specifications							
Rated voltage (V)	—			2.0	2.5	4.0	6.3	10	16	20	25
Surge voltage (V)	Room temperature			2.6	3.3	5.2	8.2	11.5	18.4	23	25
Category temperature range (°C)	—			−55 to +105							
Capacitance tolerance (%)	120Hz/20°C			M : ±20							
Dissipation Factor (DF)	120Hz/20°C			Please see the attached characteristics list							
Leakage current*2	Rated voltage applied, after 2 minutes			Please see the attached characteristics list							
Equivalent series resistance (ESR)	100kHz to 300kHz/20°C			Please see the attached characteristics list							
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz, +20°C	−55°C	Z/Z <sub>20°C</sub>	0.75 to 1.25							
		+105°C	Z/Z <sub>20°C</sub>	0.75 to 1.25							
Endurance*3	105°C, 1,000 to 2,000h, Rated voltage applied (25V → 20V applied) *1	ΔC/C		Within ±20% of the initial value							
		DF		Within 1.5 times of the initial limit							
		LC		Within the initial limit							
Damp heat(Steady state)	60°C, 90 to 95%RH, 1,000h, No-applied voltage	ΔC/C		Within ±20% of the initial value							
		DF		Within 2 times of the initial limit							
		LC		Within the initial limit							
Resistance to soldering heat	Flow method (260±5°C X 10s)	ΔC/C		Within ±5% of the initial value							
		DF		Within 1.5 times of the initial limit							
		LC		Within the initial limit (after voltage processing)							

\*1 Please reduce 0.25V per 1°C from over 85°C for 25V products.

\*2 In case of some problems for measured values, measure after applying rated voltage for 2.0 to 20V products or temperature derating voltage for 25V products for 30 minutes at 105°C.

\*3 C', E', F, C, D size:1,000h. E, F, Fo, G size:2,000h.(2.0V, 25V, 4SP1000M, 2R5SP1200M:1,000h)

### Dimensions



(unit : mm)

Size code	φD +0.5max	L max	F	φd ±0.05	G max	K max
C'	6.3	6.0	2.5 ±0.5	0.60	0.5	0.5
E'	8.0	6.0	3.5 ±0.5	0.60	0.8	0.8
F'	10.0	6.0	5.0 ±0.5	0.60	0.8	0.8
C	6.3	7.8	2.5 ±0.5	0.60	0.5	0.5
D	6.3	10.8	2.5 ±0.5	0.60	0.5	0.5
E	8.0	11.5	3.5 ±0.5	0.60	0.8	0.8
F	10.0	11.5	5.0 ±0.5	0.60	0.8	0.8
Fo	10.0	21.0	5.0 ±0.5	0.80	0.8	0.8
G	12.5	23.0	5.0 ±1.0	0.80	0.8	0.8

### Size list

RV : Rated voltage

μF	RV	2.0	2.5	4.0	6.3	10	16	20	25
6.8									C'
10									C
18									D
22								C'	
33							C'	C	E
47							C	E'	
56						C'			F
68					C'		E'	F',D	
82					C				
100				C'	E'	F',D			
120				C				E	
150			C	E'	D				
180					F'	E	F		
220			E'	F',D					
270			D		E	F			
330			F'						
390				E					
470					F				
560			E						
680				F					
820				F					
1,000	F		F						
1,200		F							
1,500				Fo					
1,800	Fo								
2,200				G					

# SP series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance ( $\mu$ F)	ESR(m $\Omega$ ) (max) 100kHz to 300kHz/20°C	Allowable ripple current (mA <sub>rms</sub> )※1	DF (% max)	Leakage current ( $\mu$ A)(max) After 2 minutes
C'	25SP6R8M	25	6.8	60	1510	6	17
	20SP22M	20	22	50	1580	6	44
	16SP33M	16	33	50	1580	6	52.8
	10SP56M	10	56	45	1710	6	56
	6SP68M	6.3	68	40	1850	6	42.84
	4SP100M	4.0	100	40	1850	6	40
E'	20SP47M	20	47	36	2210	7	94
	16SP68M	16	68	34	2280	7	108.8
	10SP100M	10	100	32	2350	7	100
	6SP150M	6.3	150	30	2420	7	94.5
	4SP220M	4.0	220	28	2510	7	88
F'	20SP68M	20	68	34	2800	7	136
	16SP100M	16	100	32	2890	7	160
	10SP180M	10	180	29	2990	7	180
	6SP220M	6.3	220	28	3100	7	138.6
	4SP330M	4.0	330	24	3230	7	132
C	25SP10M	25	10	55	1560	7	25
	20SP33M	20	33	45	1710	7	66
	16SP47M	16	47	45	1710	7	75.2
	10SP82M	10	82	40	1850	7	82
	6SP120M	6.3	120	35	1930	7	75.6
	4SP150M	4.0	150	35	1930	7	60
D ※2	25SPS18M	25	18	40	2230	8	45
	20SPS68M	20	68	30	2580	8	136
	16SPS100M	16	100	25	2820	8	160
	10SPS150M	10	150	25	2820	8	150
	6SPS220M	6.3	220	20	3160	8	138.6
	4SPS270M	4.0	270	20	3160	8	108
E	25SP33M	25	33	30	2780	8	82.5
	20SP120M	20	120	24	3110	8	240
	16SP180M	16	180	20	3410	8	288
	10SP270M	10	270	18	3600	8	270
	6SP390M	6.3	390	16	3810	8	245.7
	4SP560M	4.0	560	14	4080	8	224
F	25SP56M	25	56	25	3260	8	140
	20SP180M	20	180	20	4280	8	360
	16SP270M	16	270	18	4400	8	432
	10SP470M	10	470	15	4510	8	470
	6SP680M	6.3	680	13	4840	8	428.4
	4SP820M	4.0	820	12	5040	8	328
	4SP1000M	4.0	1000	12	5040	8	400
	2R5SP1200M	2.5	1200	12	5040	8	450
	2SP1000M	2.0	1000	11	5260	8	400
Fo	4SP1500M	4.0	1500	8	6500	10	600
	2SP1800M	2.0	1800	8	6500	10	720
G	4SP2200M	4.0	2200	9	7100	12	880

※1 100kHz, +45°C

※2 D size is indicated to SPS series.

## Temperature coefficient for allowable ripple current

Ambient temp.	$T_x \leq 45^\circ\text{C}$	$45^\circ\text{C} < T_x \leq 65^\circ\text{C}$	$65^\circ\text{C} < T_x \leq 85^\circ\text{C}$	$85^\circ\text{C} < T_x \leq 95^\circ\text{C}$	$95^\circ\text{C} < T_x \leq 105^\circ\text{C}$
Coefficient	1	0.85	0.7	0.4	0.25

## Frequency coefficient for allowable ripple current

Frequency	$120\text{Hz} \leq f < 1\text{kHz}$	$1\text{kHz} \leq f < 10\text{kHz}$	$10\text{kHz} \leq f < 100\text{kHz}$	$100\text{kHz} \leq f \leq 500\text{kHz}$
Coefficient	0.05	0.2	0.5	1