

# SP Series

Large Capacitance

Optimum for Audio etc

Low ESR

The characteristics of SP series are large capacitance (about 2 times 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.



## Specifications

Items	Conditions	Characteristics	
Category temperature range	—	-55°C to +105°C	
Tolerance on rated capacitance	120Hz	M : ±20%	
Tangent of loss angle	120Hz	Less than or equal to the value of Table13	
Leakage current ※2	After 2 minutes	Less than or equal to the value of Table13	
ESR	100KHz to 300KHz	Less than or equal to the value of Table13	
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%
		tanδ	1.5 times or less than an initial standard
		Leakage current	Below an initial standard
Damp heat (Steady state)	60°C, 90 to 95%RH 1,000h, No-applied voltage	ΔC/C	Within ±20%
		tanδ	2 times or less than an initial standard
		Leakage current	Below an initial standard
Resistance to soldering heat	Flow method (260±5°C X 10s)	ΔC/C	Within ±5%
		tanδ	1.5 times or less than an initial standard
		Leakage current	Below an initial standard (after voltage processing)

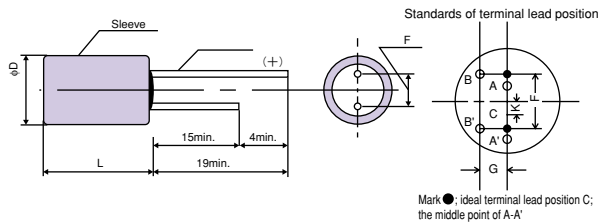
※1 Please reduce 0.25V per 1°C from over 85°C for 25V products.

※2 In case of some problems for measured values, measure after applying rated voltage for 2 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. (2V, 25V, 4SP1000M, 2R5SP1200M : 1,000h)

## Dimensions

(unit : mm)



Size Code	φD+0.5max.	Lmax.	F	φd±0.05	Gmax.	Kmax.
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 (SV) : Surge voltage (Room temperature)

μF	RV (SV)	2 (2.6)	2.5 (3.3)	4 (5.2)	6.3 (8.2)	10 (12)	16 (18.4)	20 (23.0)	25 (25.0)
6.8									C'
10									C
18									D
22								C'	E
33							C	E'	F
47						C'	E'	F',D	
56									
68					C'				
82						C			
100				C'		E'	F',D		
120					C			E	
150				C	E'	D		F	
180						F'	E		
220				E'	F',D				
270				D		E	F		
330				F'					
390									
470						E			
560									
680				E					
820					F				
1000	F			F					
1200		F							
1500				Fo					
1800	Fo								
2200				G					

※For the minimum packing quantity, please refer to page 55.

Table13 SP Series Characteristics List

Size Code	Part Number	Rated voltage (V)	Rated capacitance ( $\mu$ F)	ESR 100kHz to 300kHz (m $\Omega$ ) (max.)	Allowable ripple current (mA rms) ※2	Tangent of loss angle (max.)	Leakage current ( $\mu$ A) (max.) ※1
C'	25SP6R8M	25	6.8	60	1510	0.06	17.00
	20SP22M	20	22	50	1580	0.06	44.00
	16SP33M	16	33	50	1580	0.06	52.80
	10SP56M	10	56	45	1710	0.06	56.00
	6SP68M	6.3	68	40	1850	0.06	42.84
	4SP100M	4	100	40	1850	0.06	40.00
E'	20SP47M	20	47	36	2210	0.07	94.00
	16SP68M	16	68	34	2280	0.07	108.80
	10SP100M	10	100	32	2350	0.07	100.00
	6SP150M	6.3	150	30	2420	0.07	94.50
	4SP220M	4	220	28	2510	0.07	88.00
F'	20SP68M	20	68	34	2800	0.07	136.00
	16SP100M	16	100	32	2890	0.07	160.00
	10SP180M	10	180	29	2990	0.07	180.00
	6SP220M	6.3	220	28	3100	0.07	138.60
	4SP330M	4	330	24	3230	0.07	132.00
C	25SP10M	25	10	55	1560	0.07	25.00
	20SP33M	20	33	45	1710	0.07	66.00
	16SP47M	16	47	45	1710	0.07	75.20
	10SP82M	10	82	40	1850	0.07	82.00
	6SP120M	6.3	120	35	1930	0.07	75.60
	4SP150M	4	150	35	1930	0.07	60.00
D ※3	25SPS18M	25	18	40	2230	0.08	45.00
	20SPS68M	20	68	30	2580	0.08	136.00
	16SPS100M	16	100	25	2820	0.08	160.00
	10SPS150M	10	150	25	2820	0.08	150.00
	6SPS220M	6.3	220	20	3160	0.08	138.60
	4SPS270M	4	270	20	3160	0.08	108.00
E	25SP33M	25	33	30	2780	0.08	82.50
	20SP120M	20	120	24	3110	0.08	240.00
	16SP180M	16	180	20	3410	0.08	288.00
	10SP270M	10	270	18	3600	0.08	270.00
	6SP390M	6.3	390	16	3810	0.08	245.70
	4SP560M	4	560	14	4080	0.08	224.00
F	25SP56M	25	56	25	3260	0.08	140.00
	20SP180M	20	180	20	4280	0.08	360.00
	16SP270M	16	270	18	4400	0.08	432.00
	10SP470M	10	470	15	4510	0.08	470.00
	6SP680M	6.3	680	13	4840	0.08	428.40
	4SP820M	4	820	12	5040	0.08	328.00
	4SP1000M	4	1000	12	5040	0.08	400.00
	2R5SP1200M	2.5	1200	12	5040	0.08	450.00
2SP1000M	2	1000	11	5260	0.08	400.00	
Fo	4SP1500M	4	1500	8	6500	0.10	600.00
	2SP1800M	2	1800	8	6500	0.10	720.00
G	4SP2200M	4	2200	9	7100	0.12	880.00

※1 After 2 minutes ※2 100kHz, +45°C

※3 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