

Conductive Polymer Aluminum Solid Capacitors

OS-CON



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※ Yellow letters : Update
 ※ Red letters : New series

POSCAP



Guidelines and precautions for use

About capacitors

Please take note of the following points in order to make the best use of capacitor's performance.

Please use capacitors within the range of specified performance after confirming each capacitor's usage environment and circuit condition.

Please choose capacitors that match the lifetime of the intended circuit design.

The performance of capacitors is changed by the temperature or frequency. Therefore, please consider these variations when designing the circuit.

Please buy capacitors from our official distributors. Otherwise there is no warranty.

Line-up

Conductive Polymer Aluminum Solid Capacitors **OS-CON**
Conductive Polymer Tantalum Solid Capacitors **POSCAP**

Considerations when using in industrial equipment

To when capacitors are used in industrial equipment, allow wider margin of capacitance, impedance and other characteristics.

Polarity

OS-CON and **POSCAP** have polarity.
Please confirm the polarity prior to use. If it is used with the reverse polarities, leakage current, shorter lifetime or a short circuit may result.
There is no bi-polar model of the **OS-CON** and **POSCAP**.

Rating and category

The definition of rating and category is as follows.

- ☐ Rated temperature:
The maximum ambient temperature at which rated voltage may be continuously applied.
- ☐ Rated voltage:
The maximum direct voltage or peak value of pulse voltage which may be applied continuously to a capacitor at any temperature between the lower category temperature and the rated temperature.
- ☐ Category temperature range:
The range of ambient temperatures for which a capacitor has been designed to operate continuously; this is given by the lower and upper category temperature.
- ☐ Category voltage:
The maximum voltage which may be applied continuously to a capacitor at its upper limit of category temperature.

Operating temperature and ripple current

- ☐ Set the operating temperature so that it falls within the range stipulated in this delivery specification.
- ☐ Do not apply current that exceeds the allowable ripple current. When excessive ripple current is applied, internal heat increases and reduces the lifetime.

In case capacitors are used under the condition out of the specified frequency, ripple current shall not exceed the value revised by the frequency coefficient.

Parallel connection

Ripple current may be flowed to a capacitor that has lower impedance when a different kind of capacitor is used in parallel.

Please be very careful of choosing models.

Please consider the balance of electric current when more than two capacitors are connected in parallel.

Applied voltage for designing

Do not apply voltages exceeding the full rated voltage. If such voltage is applied, it may cause short circuit even though it is just a moment.

- ☐ 90% and below of the rated voltage or category voltage of the **POSCAP** is recommended. If the rated voltage is 10V or over except for TQC series, 80% and below of the rated voltage or category voltage is recommended.
- ☐ The sum of the DC voltage plus the peak AC voltage shall not exceed the rated voltage or category voltage.
- ☐ The sum of the DC voltage plus the negative peak AC voltage shall not allow reverse voltage.
- ☐ Do not apply reverse voltage.

Please contact us when there is a concern that circuit operation may cause reverse voltage.

Operating environment restrictions

Do not use the capacitor in the following environments

- ☐ Places where water, salt water or oil can directly fall on it and places where dew condensation may form
- ☐ Places with noxious gas (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc)
- ☐ Places susceptible to ozone, ultraviolet rays and radiation
- ☐ Places where vibration or shock exceeds the allowable value as specified in the catalog or specification sheet
- ☐ Places under direct sunlight

Land pattern

Please design hole space and hole diameter of circuit board for capacitor radial lead type, or land patterns for capacitor SMD type with consideration of the product dimension specified in the catalog or specification sheet and the size tolerance. Avoid locating heat-generating components around the capacitor and on the underside of the PC board. When a capacitor is mounted to the double sided circuit board, avoid placing through holes under the capacitor. Avoid having the printed wire under the capacitor.

Soldering

- ☐ The soldering conditions as soldering iron, flow soldering, reflow soldering should be under the range prescribed in specifications.
- ☐ If the specifications are not followed, there is a possibility of the cosmetic defection, the intensive increase of leakage current or the capacitance reduction.
- ☐ Soldering heat stress to capacitor varies depending on temperature, duration time, mounting condition such as size, material and component quantity of PC board. Please check the heat durability in your actual soldering condition.

Guidelines and precautions for use

About capacitors

Things to be noted before mounting

- ☐ Do not reuse capacitors that have been assembled in a set and energized.
- ☐ Leakage current may increase when capacitors are stored for long term. In this case, we recommend you to apply the rated voltage for 1 hour at 60°C to 70°C with a resistor load of 1kΩ.
- ☐ In case the capacitor has re-striking-voltage, please apply the rated voltage to the capacitor through a resistor load of 1kΩ.

Mounting 1

- ☐ Please mount capacitors after confirming the polarity.
- ☐ Please mount capacitors after confirming its rated capacitance and rated voltage.
- ☐ When mounting capacitors to the circuit board, please use capacitors with the lead space matching the hole space of the circuit board.
- ☐ Do not drop capacitors or use capacitors dropped beforehand.
- ☐ Be careful not to deform the capacitor during installation.

Mounting 2

- ☐ When an automatic inserter is used to clinch the capacitor lead terminal, make sure it is not set too strongly.
- ☐ Be careful of the shock force that can be produced by absorbers, product chckers and centers on automatic inserters and installers.
- ☐ Do not apply excessive external force to the lead terminal or the capacitor itself.

Storage conditions

It is necessary to maintain a good storage environment in order to prevent the problem when soldering due to the degradation of solderability or moisturization of molding resin.

- ☐ When storing the reel in the storage bag, please ensure that the storage bag is fully sealed.※
- ☐ Do not store in high temperature and high humidity environment.
- ☐ For duration of storage, refer to the respective "Guidelines and precautions for use" of each capacitor.
- ☐ Do not store in damp conditions such as with water, salt water, or oil, and dew condensation.
- ☐ Do not store in places filled with noxious gas (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc).
- ☐ Do not store in places susceptible to ozone, ultraviolet rays and radiation.
- ☐ Please unseal storage bag just before mounting and be conscious that the capacitors are used up. Refer to the respective "Guidelines and precautions for use" of each capacitor when some remain by necessity.

※Only for capacitors packed by laminate bag.

Disposal of capacitors

Capacitors comprise solid organic compounds, various metals, resin, rubber, etc. Treat them as industrial waste when disposing of it.

In case of disposing of a large amount of capacitor, we can dispose on your behalf.

OS-CON OS-CON Line-up Guidelines and precautions Series system diagram Image of case size Products list Packing specifications (SMD type) Packing specifications (Radial lead type) Recommended soldering condition Fundamental structure Characteristics Reliability Selection guide														
OS-CON Line-up														
Surface mount type	Classification	Series	Page	Features	Small size · Low profile	Large capacitance	Low ESR	High voltage	Long life · High reliability	Size code	Category temperature range(°C)	Rated voltage range (V. DC)	Capacitance range(μF)	Marking color
	Surface mount type	SXV	33	Super high voltage 105°C 5,000h				●		E12	-55 to +105	63 to 100	15 to 33	Purple
		SVPG	34	Low ESR High ripple current			●		●	B45	-55 to +105	16 to 25	15 to 47	Purple
										C10	-55 to +105	16	270	
		SVPF	35 to 36	High voltage Large capacitance 105°C 5,000h		●		●	●	B6	-55 to +105	16 to 25	27 to 82	Purple
										C6	-55 to +105	16 to 50	10 to 180	
										E7	-55 to +105	16 to 50	18 to 270	
										E12	-55 to +105	16 to 50	39 to 560	
										F12	-55 to +105	16 to 50	68 to 1,000	
		SVPE	37 to 38	Super low ESR Large capacitance		●	●			B6	-55 to +105	2.5 to 6.3	150 to 390	Purple
										C6	-55 to +105	2.5 to 10	220 to 390	
										C10	-55 to +105	2.0 to 1.6	180 to 1,200	
										F12	-55 to +105	16	470	
		SVPS	39 to 40	Long life					●	A5	-55 to +105	4.0 to 10	10 to 33	Purple
										B6	-55 to +105	4.0 to 16	22 to 68	
										C6	-55 to +105	4.0 to 20	22 to 150	
										E7	-55 to +105	4.0 to 25	10 to 270	
										F8	-55 to +105	4.0 to 16	100 to 680	
		SVPD	41 to 42	Guaranteed at 125°C Rated 35V max. 85°C85% RH					●	●	C6	-55 to +125	10 to 25	10 to 56
	E7										-55 to +125	16 to 35	8.2 to 82	
	F8										-55 to +125	25 to 35	18 to 39	
	E12										-55 to +125	25 to 35	22 to 47	
	F12										-55 to +125	25 to 35	47 to 82	
	SVPC	43 to 44	Low ESR Large capacitance		●	●			B6	-55 to +105	2.5 to 16	39 to 180	Purple	
									C6	-55 to +105	2.5 to 16	68 to 560		
									E7	-55 to +105	2.5 to 16	120 to 680		
									E12	-55 to +105	2.5 to 16	270 to 1,500		
									F12	-55 to +105	2.5	2,700		
	SVPB	45 to 46	Low profile	●					C5	-55 to +105	2.5 to 20	15 to 120	Purple	
									C55	-55 to +105	20	22		
	SVPA	47 to 48	Low ESR High ripple current			●			B6	-55 to +105	2.5 to 20	10 to 82	Purple	
									C6	-55 to +105	2.5 to 20	22 to 180		
									E7	-55 to +105	2.5 to 20	47 to 330		
									F8	-55 to +105	2.5 to 16	180 to 820		
	SVQP	49 to 50	Guaranteed at 125°C					●	C6	-55 to +125	4.0 to 20	22 to 150	Purple	
									E7	-55 to +125	6.3 to 20	47 to 220		
	SVP	51 to 52	Standard						A5	-55 to +105	4.0 to 16	3.3 to 33	Purple	
									B6	-55 to +105	4.0 to 20	10 to 68		
									C6	-55 to +105	2.5 to 20	22 to 220		
									E7	-55 to +105	4.0 to 20	33 to 330		
									F8	-55 to +105	4.0 to 20	56 to 680		
									E12	-55 to +105	2.5 to 20	100 to 680		
F12									-55 to +105	2.5 to 20	150 to 1,500			

POSCAP

POSCAP Line-up

Guidelines and precautions

Selection guide

Technical data

Surface mount type

Catalog Deletion and EOL models

Selection guide	Series system diagram
	Image of case size
	Products list
	Packing specifications (SMD type)

Technical data	Packing specifications (Radial lead type)
	Recommended soldering condition
	Fundamental structure
	Characteristics

Surface mount type	SVX
	SVPG
	SVPF
	SVPE
	SVPS
	SVPD
	SVPC
	SVPB
	SVPA
	SVQP

Radial lead type	SXE
	SEPF
	SEPC
	SEQP
	SEP

Catalog Deletion and EOL series

Selection guide

Technical data

Surface mount type

Catalog Deletion and EOL models

Classification	Series	Page	Features	Small size · Low profile	Large capacitance	Low ESR	High voltage	Long life · High reliability	Size code	Category temperature range(°C)	Rated voltage range (V.DC)	Capacitance range(μF)	Marking color
Radial lead type	SXE	53	Super high voltage 105°C 5,000h				●		E12	-55 to +105	63 to 100	15 to 33	Purple
	SEPF	54	Small size · Low profile High voltage Large capacitance 105°C 5,000h	●	●		●	●	C55	-55 to +105	16 to 32	22 to 150	Purple
									C6	-55 to +105	16 to 35	22 to 180	
									E7	-55 to +105	16 to 35	39 to 270	
									E12	-55 to +105	16 to 35	82 to 560	
									F13	-55 to +105	16 to 35	120 to 1,000	
	SEPC	55 to 56	Super low ESR Large capacitance Small size Low profile 105°C 5,000h	●	●	●		●	B9	-55 to +105	2.5	100 to 560	Purple
									C55	-55 to +105	6.3	220	
									C6	-55 to +105	2.5 to 16	100 to 560	
									C7	-55 to +105	6.3	470	
									C9	-55 to +105	2.5 to 16	100 to 820	
									E7	-55 to +105	2.5 to 16	150 to 1,000	
									E9	-55 to +105	2.5 to 16	180 to 1,000	
									E12	-55 to +105	16	180 to 270	
									E13	-55 to +105	2.5 to 6.3	470 to 820	
									F13	-55 to +105	2.5 to 16	470 to 2,700	
	SEQP	57 to 58	105°C 5,000h Guaranteed at 125°C Rated 32V max.					● ●	C6	-55 to +125	4.0 to 20	22 to 150	Purple
									E7	-55 to +125	4.0 to 32	6.8 to 330	
									F8	-55 to +125	4.0 to 32	15 to 680	
									E12	-55 to +125	4.0 to 32	18 to 560	
									F13	-55 to +125	4.0 to 20	150 to 1,200	
	SEP	59 to 60	Standard						C6	-55 to +105	4.0 to 20	22 to 150	Purple
									E7	-55 to +105	4.0 to 20	33 to 330	
									F8	-55 to +105	4.0 to 20	56 to 680	
									E12	-55 to +105	2.5 to 20	100 to 680	
									F13	-55 to +105	2.5 to 20	150 to 1,500	

Other precautions

1. Leakage current

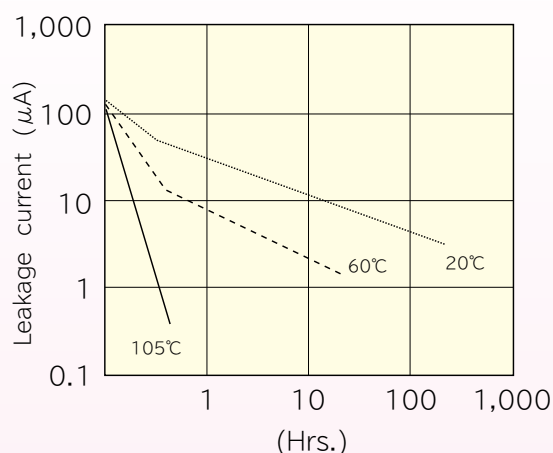
Mechanical stress may cause OS-CON's leakage current increased.

In such a case, leakage current will gradually decrease by applying voltage (within the category voltage and the upper limit of category temperature).

Then, self-healing speed of leakage current is faster when it is near to the upper limit of category temperature and the category voltage.

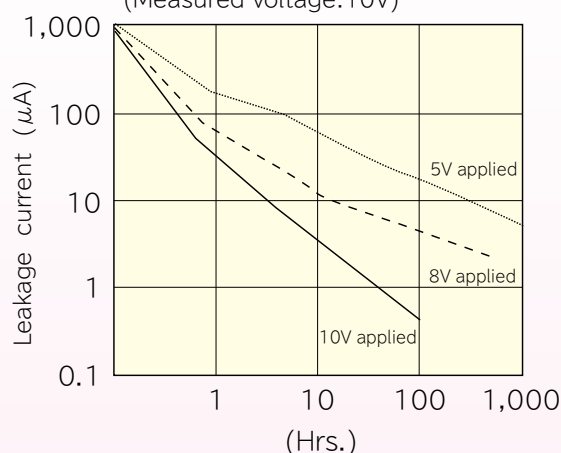
OS-CON

leakage current restoration characteristics
16V/10 μ F (16V DC applied)



OS-CON

leakage current restoration characteristics
10V/33 μ F (Ambient temperature: 65°C)
(Measured voltage: 10V)



※To make the recovery of LC values easy to show, samples that LC values have been increased on purpose are used in the test.

2. Rapid charge and discharge limitation

Allowance of a large rush current to flow due to rapid charge and discharge may result in short circuit or large leakage current. The protection circuit, to maintain high reliability, is recommended when rush current to flow to the OS-CON is in the following cases.

- Products which 10 times of allowable ripple current is less than 10A: It is when 10A or over of rush current is applied
- Products which 10 times of allowable ripple current is 10A or over: It is when rush current, which the figure is over 10 times of allowable ripple current, is applied.

OS-CON OS-CON Line-up Guidelines and precautions Series system diagram Image of case size Products list Packing specifications (SMD type) Packing specifications (Radial lead type) Recommended soldering condition Fundamental structure Characteristics Reliability Catalog Deletion and EOL series POSCAP POSCAP Line-up Guidelines and precautions Selection guide Technical data Surface mount type Catalog Deletion and EOL models	Guidelines and precautions	3.Soldering with a soldering iron (a) When lead terminals for radial lead type must be processed because the lead pitch and the PCB holes do not match, process them without any stresses to the OS-CON before soldering. (b) Solder without any excessive stresses to the OS-CON itself. (c) When the OS-CON has been soldered once and needs to be removed, remove it after the solder has been completely melted. (d) Do not let the tip of the soldering iron touch the OS-CON itself.	6.Handling after soldering Do not subject the OS-CON to excessive stress as follows. (a) Do not tilt, bend or twist the OS-CON. (b) Do not move the PCB with holding the OS-CON itself. (c) Do not hit the OS-CON with objects. (d) When stacking PCBs, make sure that the OS-CON does not touch other PCBs or components.
		4.Flow soldering (a) Do not apply flow soldering to OS-CON SMD type. (b) Do not solder the OS-CON itself by submerging it in melted solder. Solder the opposite side that the OS-CON is mounted on. (c) Note that flux does not adhere to anywhere except the lead terminal. (d) Note that other components do not fall over and touch the OS-CON when soldering.	7.Cleaning PCB Check the following items before washing PC board with these detergents: high quality alcohol-based cleaning fluid such as Pine-α ST-100S, clean thru 750H, 750L, 710M, 750K or Techno Care FRW 14 through 17 or detergents including substitute freon as AK-225AES or IPA. (a) Use immersion or ultrasonic waves to clean within 2 minutes. (b) The temperature of the cleaning fluid should be less than 60℃. (c) Watch the contamination of the detergent such as conductivity, pH, specific gravity, water content, etc. (d) Do not store the OS-CON in a location subject to gases from the cleaning fluid or in an airtight container after cleaning. (e) Dry the PCB or OS-CON with hot air that should be less than the upper category temperature. (f) Please note that indication may disappear when rubbing print side after washing depending on a cleaner. (g) Please contact us for details about detergents, cleaning methods and detergents other than those listed above.
		5.Reflow soldering (a) Do not apply reflow soldering to OS-CON Radial Lead type. (b) Please contact us for setting VPS conditions.	

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3.Soldering with a soldering iron

- (a) When lead terminals for radial lead type must be processed because the lead pitch and the PCB holes do not match, process them without any stresses to the OS-CON before soldering.
- (b) Solder without any excessive stresses to the OS-CON itself.
- (c) When the OS-CON has been soldered once and needs to be removed, remove it after the solder has been completely melted.
- (d) Do not let the tip of the soldering iron touch the OS-CON itself.

4.Flow soldering

- (a) Do not apply flow soldering to OS-CON SMD type.
- (b) Do not solder the OS-CON itself by submerging it in melted solder.

Solder the opposite side that the OS-CON is mounted on.
- (c) Note that flux does not adhere to anywhere except the lead terminal.
- (d) Note that other components do not fall over and touch the OS-CON when soldering.

5.Reflow soldering

- (a) Do not apply reflow soldering to OS-CON Radial Lead type.
- (b) Please contact us for setting VPS conditions.

6.Handling after soldering

- Do not subject the OS-CON to excessive stress as follows.
- (a) Do not tilt, bend or twist the OS-CON.
 - (b) Do not move the PCB with holding the OS-CON itself.
 - (c) Do not hit the OS-CON with objects.
 - (d) When stacking PCBs, make sure that the OS-CON does not touch other PCBs or components.

7.Cleaning PCB

- Check the following items before washing PC board with these detergents: high quality alcohol-based cleaning fluid such as Pine-α ST-100S, clean thru 750H, 750L, 710M, 750K or Techno Care FRW 14 through 17 or detergents including substitute freon as AK-225AES or IPA.
- (a) Use immersion or ultrasonic waves to clean within 2 minutes.
 - (b) The temperature of the cleaning fluid should be less than 60℃.
 - (c) Watch the contamination of the detergent such as conductivity, pH, specific gravity, water content, etc.
 - (d) Do not store the OS-CON in a location subject to gases from the cleaning fluid or in an airtight container after cleaning.
 - (e) Dry the PCB or OS-CON with hot air that should be less than the upper category temperature.
 - (f) Please note that indication may disappear when rubbing print side after washing depending on a cleaner.
 - (g) Please contact us for details about detergents, cleaning methods and detergents other than those listed above.

Selection guide	Series system diagram
	Image of case size
	Products list
	Packing specifications (SMD type)
	Packing specifications (Radial lead type)

Technical data	Recommended soldering condition
	Fundamental structure
	Characteristics
	Reliability

Surface mount type	SXV
	SVPG
	SVPF
	SVPE
	SVPS
	SVPD
	SVPC
	SVPB
	SVPA
	SVQP
SVP	

Radial lead type	SXE
	SEPF
	SEPC
	SEQP
	SEP

Selection guide

Technical data

Surface mount type

8. Fixatives and coating materials

- Select the appropriate covering and sealant materials for the **OS-CON**. In particular, don't use acetone in the fixative, coating agent and diluent.
- Before applying the fixative or coating, completely remove any flux residue and foreign matter from the area where the board and the **OS-CON** will be jointed together.
- Allow any detergent to dry before applying the fixative or coating.
- Please contact us for the fixative and coating heat curing conditions.

9. Capacitor insulation

Be sure to completely separate the case, negative lead terminal, positive lead terminal and PC board patterns with each other due to the following reasons.

- Insulation is not guaranteed at a part of resin on the surface of a case.
- It offers inconstant resistance between a case and a negative lead terminal and it isn't insulated.

10. Storage conditions

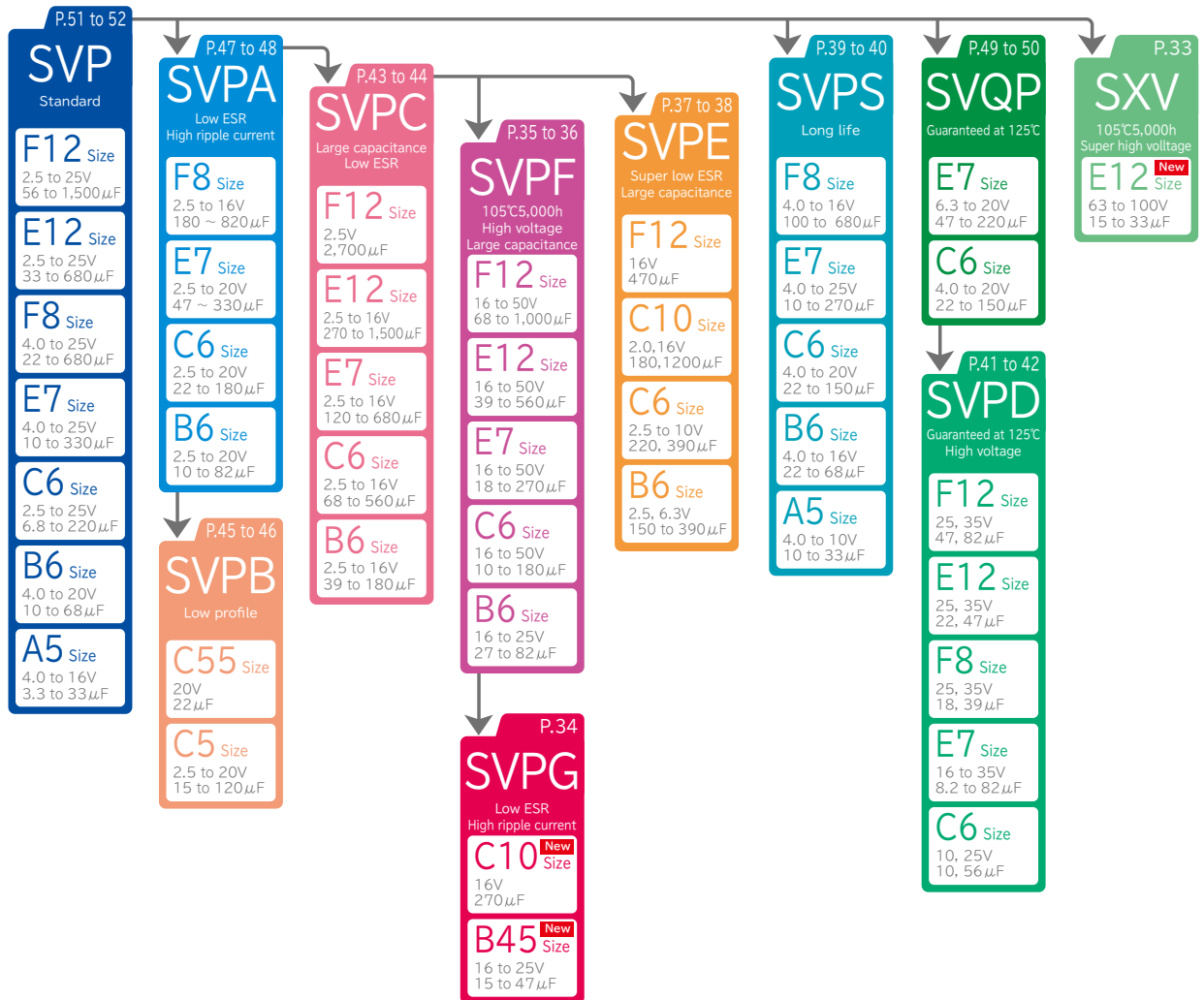
Open the bags just before mounting and use up all products once opened.
For keeping a good solderability, store the **OS-CON** as follows.

		Before unsealing	After unsealing
SMD type※1		Within 24 months after shipment	Within 30 days from opening (packaged with carrier tape)
Radial lead type	Bag packing product	Within 30 months after shipment	Within 7 days from opening
	Taping product	Within 24 months after shipment	

※1 The JEDEC J-STD-020 standard is not applicable

Series system diagram

SMD type



Radial lead type

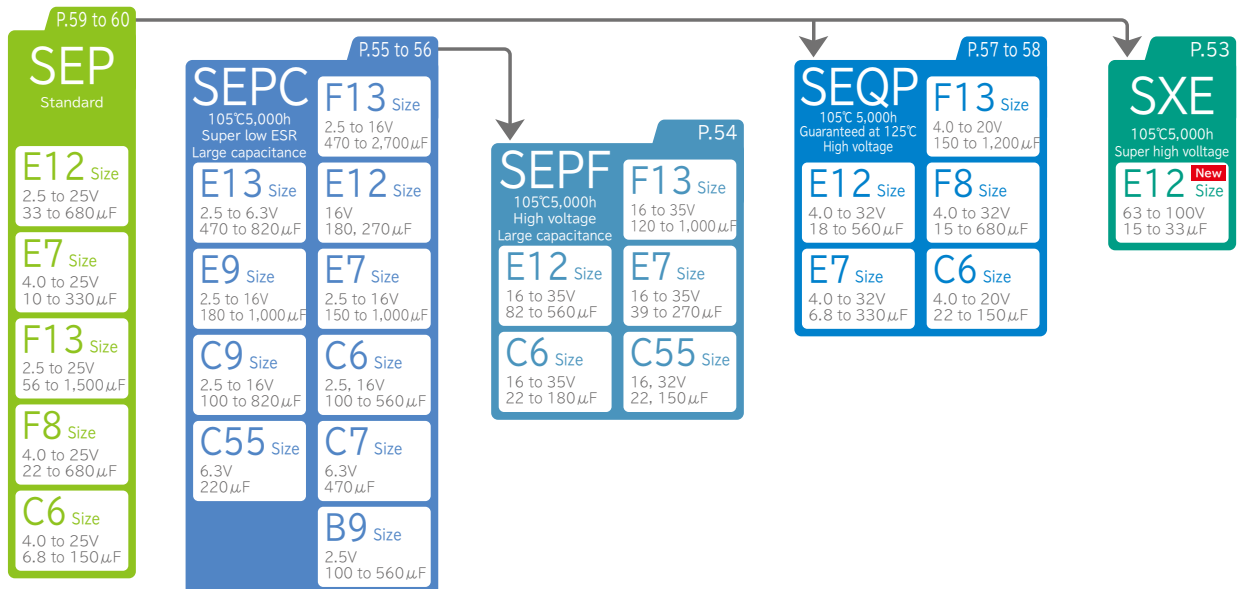
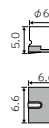
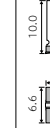
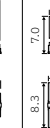
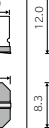


Image of case size

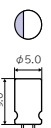
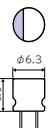
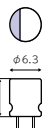
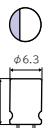
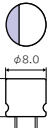
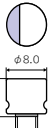
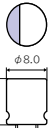
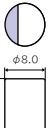
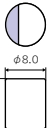
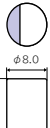
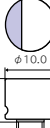
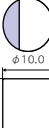
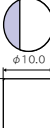
SMD type

(Unit:mm)

A5 size	B45 size	B6 size	C5 size	C55 size	C6 size	C10 size	E7 size	E12 size	F8 size	F12 size
										
P.39 to 40 SVPS P.51 to 52 SVP	New P.34 SVPG	P.35 to 36 SVPF P.37 to 38 SVPE P.39 to 40 SVPS P.43 to 44 SVPC P.47 to 48 SVPA P.51 to 52 SVP	P.45 to 46 SVPB	P.45 to 46 SVPB	P.35 to 36 SVPF P.37 to 38 SVPE P.39 to 40 SVPS P.41 to 42 SVPD P.43 to 44 SVPC P.47 to 48 SVPA P.49 to 50 SVQP P.51 to 52 SVP	New P.34 SVPG P.37 to 38 SVPE	P.35 to 36 SVPF P.39 to 40 SVPS P.41 to 42 SVPD P.43 to 44 SVPC P.47 to 48 SVPA P.49 to 50 SVQP P.51 to 52 SVP	New P.33 SXV P.35 to 36 SVPF P.41 to 42 SVPD P.43 to 44 SVPC P.51 to 52 SVP	P.39 to 40 SVPS P.41 to 42 SVPD P.47 to 48 SVPA P.51 to 52 SVP	P.35 to 36 SVPF P.37 to 38 SVPE P.41 to 42 SVPD P.43 to 44 SVPC P.51 to 52 SVP

※ Profile of case size are all indicated in maximum values.

Radial lead type

B9 size	C55 size	C6 size	C6 size	C7 size	C9 size	E7 size	E7 size	E9 size	E12 size	E12 size	E13 size	F8 size	F13 size	F13 size
														
P.55 to 56 SEPC	P.54 SEPF P.55 to 56 SEPC	P.54 SEPF P.55 to 56 SEPC	P.57 to 58 SEQP P.59 to 60 SEP	P.55 to 56 SEPC	P.55 to 56 SEPC	P.54 SEPF P.55 to 56 SEPC	P.57 to 58 SEQP P.59 to 60 SEP	P.55 to 56 SEPC	P.54 SEPF P.55 to 56 SEPC P.57 to 58 SEQP P.59 to 60 SEP	New P.53 SXV P.55 to 56 SEPC P.57 to 58 SEQP P.59 to 60 SEP	P.55 to 56 SEPC	P.57 to 58 SEQP P.59 to 60 SEP	P.54 SEPF P.55 to 56 SEPC P.57 to 58 SEQP P.59 to 60 SEP	P.55 to 56 SEPC P.57 to 58 SEQP P.59 to 60 SEP

※ Profile of case size are all indicated in maximum values.

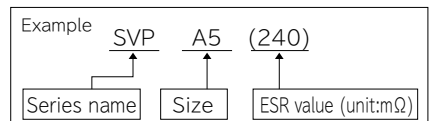
Products list

Size・ESR Matrix list / SMD type

V	Series	3.3	4.7	6.8	8.2	10	15	18	22	27	33	39	47	56	68	82	100
2.0	SVPE																
2.5	SVPE																
2.5	SVPE																
2.5	SVPC																
2.5	SVPB																
2.5	SVPA															B6 (30)	
2.5	SVP																
4.0	SVPS										A5 (200)				B6 (30)		
4.0	SVPC																
4.0	SVPB																C5 (40)
4.0	SVPA														B6 (30)		
4.0	SVQP																
4.0	SVP										A5 (200)	B6 (70)			B6 (60)		
6.3	SVPE																
6.3	SVPE																
6.3	SVPS							A5 (200)					B6 (30)				
6.3	SVPC																B6 (30,25)
6.3	SVPB															C5 (40)	
6.3	SVPA												B6 (30)				
6.3	SVQP															C6 (45)	C6 (40)
6.3	SVP							A5 (200)					B6 (70)			C6 (45)	C6 (40)
10	SVPE																
10	SVPS					A5 (220)	A5 (200)				B6 (70)				C6 (30)		
10	SVPD													C6 (45)			
10	SVPC														B6 (30,23)		
10	SVPB													C5 (40)			
10	SVPA														C6 (30)		
10	SVQP														C6 (45)		
10	SVP		A5 (240)	A5 (240)		A5 (220)	A5 (200)				B6 (70)		C6 (50)	C6 (45)			
16	SVPG												B45 (25)				
16	SVPF															B6 (27)	
16	SVPE																
16	SVPS								B6 (90)			C6 (24)				E7 (30)	F8 (35)
16	SVPD															E7 (40)	
16	SVPC											B6 (35,27)			C6 (30,25)		C6 (24)
16	SVPB										C5 (40)						
16	SVPA											C6 (35,24)				E7 (30)	
16	SVQP						B6 (120)					C6 (50)				E7 (40)	
16	SVP	A5 (260)							B6 (90)			C6 (50)		E7 (45)		E7 (40)	F8 (35)
20	SVPG												B45 (27)				
20	SVPF													B6 (30)			
20	SVPS								C6 (60)				E7 (45)				
20	SVPB						C5 (45)		C55 (35)								
20	SVPA					B6 (40)			C6 (35)				E7 (33)				
20	SVQP								C6 (60)				E7 (45)				
20	SVP					B6 (120)			C6 (60)	C6 (60)	E7 (45)		E7 (45)	F8 (40)	F8 (40)		E12 (24)
25	SVPG							B45 (30)									
25	SVPF								B6 (40)								E7 (24)
25	SVPE																
25	SVPS					E7 (60)							C6 (30)	C6 (30)		E7 (28)	
25	SVPD					C6 (65)			E7 (48)			F8 (45)	E12 (30)			F12 (28)	
35	SVPF								C6 (35)				E7 (30)				E12 (20)
35	SVPD					E7 (70)			F8 (60)	E12 (50)			F12 (30)				
50	SVPF					C6 (40)			E7 (35)				E12 (25)			F12 (20)	
63	SXV											E12 (25)					
100	SXV						E12 (40)										

How to read the lists in P17 to 20

- The name, sizes and ESR values of each series are found where the voltage (V) and capacitance (μ F) intersect each other. (Refer to the example.)
- Please confirm the details in the list of each series from P33 to P60.
- There are two or more same series names in a cell, which part number is different each, so please check the characteristics list of the series.



[illegible]

(unit : mm)

Standard sizes				(Unit: mm)					
A5	φ4.0×L5.5	B45	φ5.0×L4.5	C5	φ6.3×L5.0	E7	φ8.0×L7.0	F8	φ10.0×L8.0
		B6	φ5.0×L6.0	C55	φ6.3×L5.5	E12	φ8.0×L12.0	F12	φ10.0×L12.7
				C6	φ6.3×L6.0				
				C10	φ6.3×L10.0				

※ Red letters : New models

Products list

Size・ESR Matrix list / Radial lead type

V	Series	μF													
		6.8	10	15	18	22	33	39	47	56	68	82	100	120	150
2.5	SEPC												B9 (7)		
	SEP														
4.0	SEPC														
	SEQP														C6 (40)
	SEP											C6 (40)			C6 (40)
6.3	SEPC														
	SEQP										C6 (45)				E7 (35)
	SEP										C6 (45)				E7 (35)
10	SEPC														
	SEQP								C6 (45)					E7 (35)	
	SEP								C6 (45)					E7 (35)	
16	SEPF														C55 (30)
	SEPC											C6 (24)			E7 (22)
	SEQP							C6 (50)				E7 (40)			F8 (30)
	SEP							C6 (50)				E7 (40)			F8 (30)
20	SEPF													C6 (25)	
	SEQP					C6 (60)			E7 (45)		F8 (40)		E12 (24)		F13 (20)
	SEP					C6 (60)	E7 (45)		E7 (45)	F8 (40)	F8 (40)		E12 (24)		F13 (20)
25	SEPF									C6 (30)		E7 (28)			
32	SEPF					C55 (35)					E7 (25)				
	SEQP	E7 (100)		F8 (80)	E12 (50)										
35	SEPF					C6 (35)		E7 (30)				E12 (20)		F13 (18)	
63	SXE						E12 (25)								
100	SXE			E12 (40)											

Standard sizes

(unit : mm)

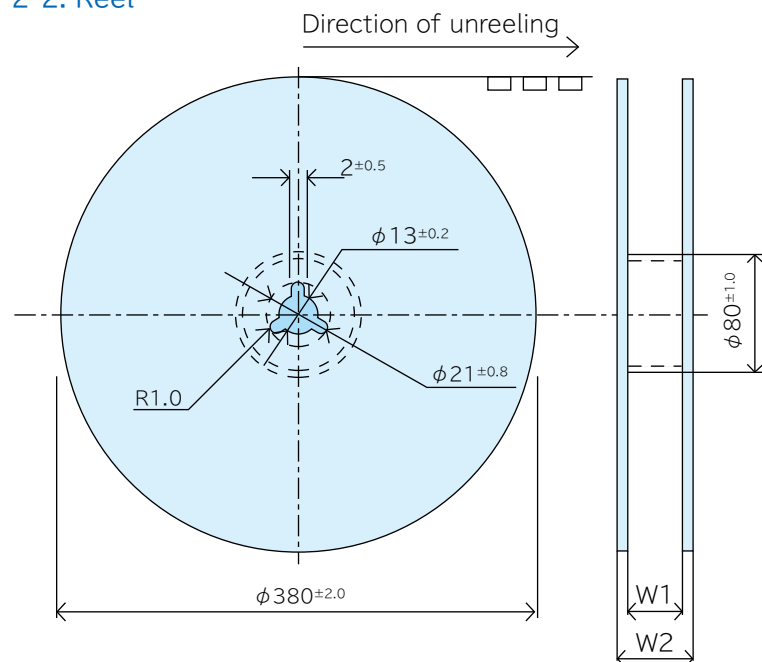
B9	$\phi 5.0 \times L9.0$	C55	$\phi 6.3 \times L5.5$	E7	$\phi 8.0 \times L7.0$	F8	$\phi 10.0 \times L8.0$
		C6	$\phi 6.3 \times L6.0$	E9	$\phi 8.0 \times L9.0$	F13	$\phi 8.0 \times L12.0$
		C7	$\phi 6.3 \times L7.0$	E12	$\phi 8.0 \times L12.0$		
		C9	$\phi 6.3 \times L9.0$	E13	$\phi 8.0 \times L13.0$		

Size・ESR Matrix list / Radial lead type

V	Series μF	180	220	270	330	390	470	560	680	820	1000	1200	1500	2700
2.5	SEPC				B9 (7)	C6 (10)	B9 (7)	B9 (7)		C9 (7)	E9 (7)			F13 (10)
					C9 (7)			C9 (7)		E7 (8)				
								E9 (8)		E9 (5,7)				
	SEP							C6 (10)		E13 (7)				
4.0	SEPC							C9 (7)	E13 (7)	F13 (7)				
								E9 (7)						
								E13 (7)						
	SEQP				E7 (35)			E12 (13)	F8 (25)			F13 (12)		
SEP		E7 (35)		E7 (35)		F8 (25)	E12 (13)	F8 (25)			F13 (12)			
6.3	SEPC		C55 (18)					E9 (8)	C9 (7)	F13 (7)		E7 (18)		F13 (10)
								C9 (7)	E9 (7)					
								E13 (8)						
	SEQP				F8 (25)			E12 (15)		F13 (12)				
SEP				F8 (25)			E12 (15)		F13 (12)					
10	SEPC			E7 (22)										
	SEQP			F8 (25)	E12 (17)			F13 (13)						
	SEP			F8 (25)	E12 (17)			F13 (13)						
16	SEPF	C6 (22)		E7 (22)				E12 (14)			F13 (12)			
	SEPC	E9 (10)	E7 (13)	E12 (11)			F13 (10)							
		E12 (16)		E9 (10)										
	SEQP	E12 (20)			F13 (16)									
SEP	E12 (20)			F13 (16)										
20	SEPF	E7 (25)				E12 (14)		F13 (12)						
	SEQP													
	SEP													
25	SEPF	E12 (16)			F13 (14)									
32	SEPF													
	SEQP													
35	SEPF													
63	SXE													
100	SXE													

※ Red letters : New models

2-2. Reel

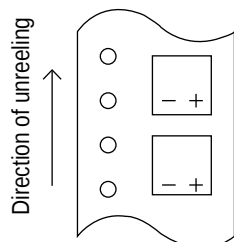


(unit : mm)

Size code	W1	W2
A5	13.0±0.5	17.5±1.0
B6, C5, C55, C6	17.0±0.5	21.5±1.0
C10, E7, F8, E12, F12	25.0±0.5	29.5±1.0

※Please contact us separately concerning about B45 size of SVPG series.

2-3. Polarity



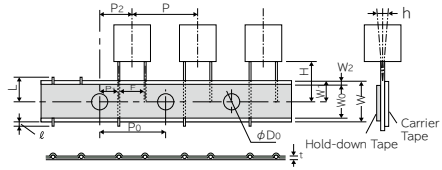
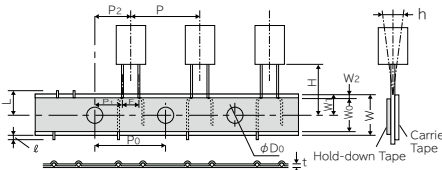
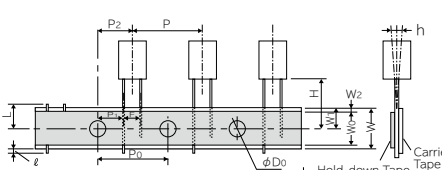
3. Minimum packing quantity and weight

Taping type

Size code	Quantity(pcs./Reel, $\phi 380$)	Typical weight(g)
A5	2,000	700
B6	1,500	800
C5	1,300	800
C55	1,000	800
C6	1,000	800
C10	500	700
E7	1,000	1,100
E12	400	800
F8	500	1,000
F12	400	1,000

※Please contact us separately concerning about B45 size of SVPG series.

2-3. Lead terminal taping

Taping code	F	Size code (ϕD)	Taping
+T	F=5.0mm	F8,F13 ($\phi 10$)	
+TS (+D)	F=3.5mm	E13 ($\phi 8$)	
+TSS (+S)	F=2.0mm F=2.5mm F=3.5mm	B9 ($\phi 5$) C55,C6,C7,C9 ($\phi 6.3$) E7,E9,E12 ($\phi 8$)	

(unit : mm)

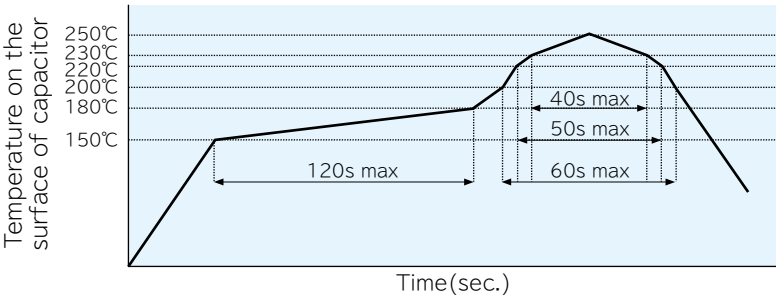
Code		F	P	P ₀	P ₁	P ₂	Δh	W	W ₀	W ₁	W ₂	H	ϕD ₀	t	ℓ	L
Tolerance		^{+0.8} _{-0.2}	±1.0	±0.2	±0.5	±1.0	±1.0	±0.5	min.	±0.5	max	±0.75	±0.2	±0.3	max	max
+T	ϕ10	5.0	12.7	12.7	3.85	6.35	0	18.0	9.5	9.0	2.5	18.5	4.0	0.6	0	11.0
+TS (+D)	ϕ8	3.5	12.7	12.7	4.60	6.35	0	18.0	9.5	9.0	2.5	17.5	4.0	0.6	0	11.0
+TSS (+S)	ϕ5	2.0	12.7	12.7	5.35	6.35	0	18.0	9.5	9.0	2.5	17.5	4.0	0.6	0	11.0
	ϕ6.3	2.5	12.7	12.7	5.10	6.35	0	18.0	9.5	9.0	2.5	17.5	4.0	0.6	0	11.0
	ϕ8	3.5	12.7	12.7	4.60	6.35	0	18.0	9.5	9.0	2.5	17.5	4.0	0.6	0	11.0

3. Minimum packing quantity and weight

Size code	Case size	Processed type discrete lead terminals		Zig-zag pack taping type	
		Quantity(pcs./Bag)	Typical weight(g)	Quantity(pcs./Bag)	Typical weight(g)
B9	$\phi 5$	500	180	2,000	1,000
C55	$\phi 6.3$	500	150	1,500	650
C6	$\phi 6.3$	500	160	1,500	700
C7	$\phi 6.3$	500	210	1,500	920
C9	$\phi 6.3$	500	240	1,500	1,000
E7	$\phi 8$	200	110	1,000	820
E9	$\phi 8$	200	130	1,000	900
E12	$\phi 8$	200	200	1,000	980
E13	$\phi 8$	200	160	1,000	1,060
F8	$\phi 10$	200	180	500	890
F13	$\phi 10$	200	280	500	940

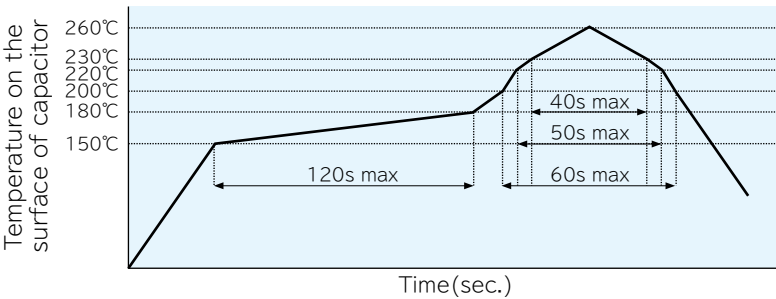
Peak temperature 250°C lead free reflow soldering profile

The cycles of reflow soldering: Twice (max)



Peak temperature 260°C lead free reflow soldering profile

The cycles of reflow soldering: Once (max)



POSCAP

POSCAP
Line-up

Guidelines and
precautions

Selection guide

Technical data

Soldering with a soldering iron

Tip of a soldering iron: $400 \pm 10^\circ\text{C}$
Working time: 5sec. max

Flow soldering

	Temperature	Time	Flow number
Preheating	120°C or less (ambient temperature)	120 sec. or less	1 time
Soldering condition	260 + 5°C or less	10 + 1 sec. or less	2 times or less ※1

※1. When soldering 2 times, total immersion time should be 10 + 1 sec. or less.

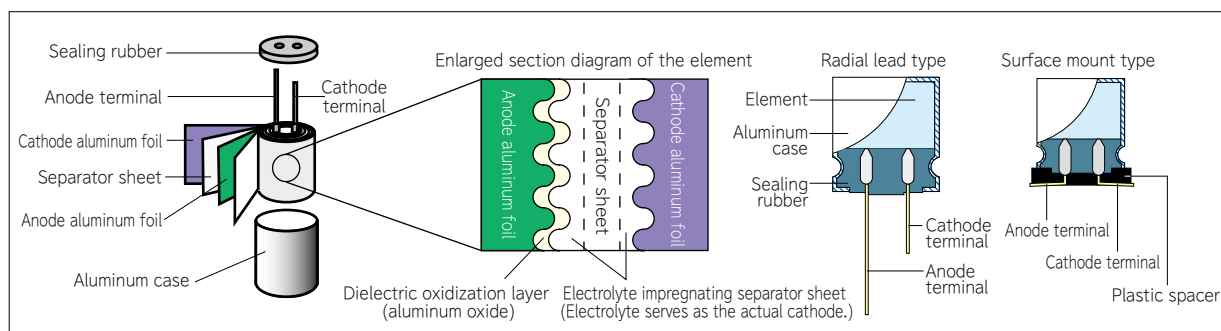
Surface mount type

Catalog Deletion and
EOL models

1. Basic structure of OS-CON

OS-CON has a basic construction similar to an aluminum electrolytic capacitor. A distinctive difference lies in **electrolyte**.

Aluminum electrolytic capacitor	Separator sheet impregnated with electrolytic solution .	Liquid electrolyte
OS-CON	Separator sheet impregnated with conductive polymer .	Solid electrolyte



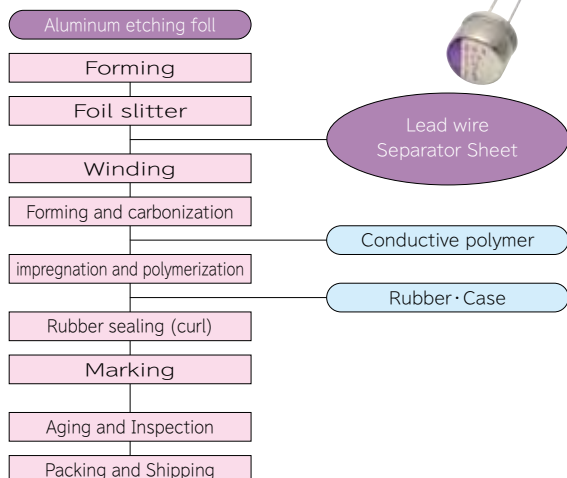
Characteristics between OS-CON and aluminum electrolytic capacitor due to a difference in electrolyte

	Aluminum electrolytic capacitor	OS-CON
Conductivity	0.01S/cm • Difficult to lower ESR due to low conductivity • ESR augments, in particular, in low temperature conditions	100S/cm • The highest electronic conductivity, realizing super low ESR. • ESR is stable in low temperature conditions
Reliability, lifespan	• Liquid electrolyte is evaporable at high temperature • Static capacitance is on the decline at high temperature • Limited lifespan resulting from dry-up • Major fluctuations in temperature characteristics	• Little evaporation due to solid electrolyte • Little decrease in static capacitance • Long lifespan even at high temperature • Very minor fluctuations in temperature characteristics
Temperature coefficient (for lifespan)	2 times by 10°C reduction 105°C/2,000h→85°C/8,000h	10 times by 20°C reduction 105°C/2,000h→85°C/20,000h

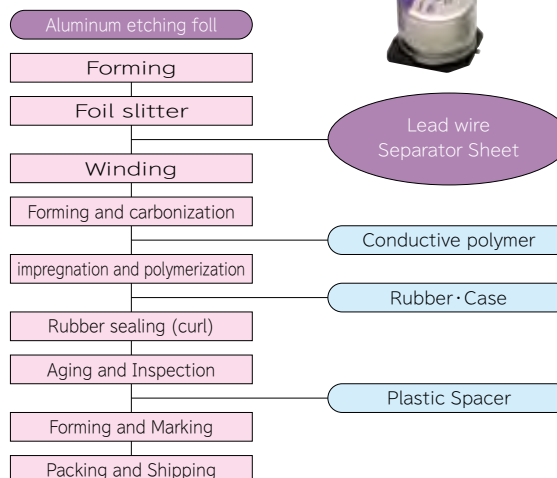
※Please contact us separately if you require life factor of SXV, SXE series.

2. OS-CON Manufacturing Method

[Radial lead type]



[Surface mount type]



Characteristics

1. OS-CON Electrical characteristics

1-1. Frequency characteristics

Fig.A Impedance frequency characteristics (OS-CON vs other types)

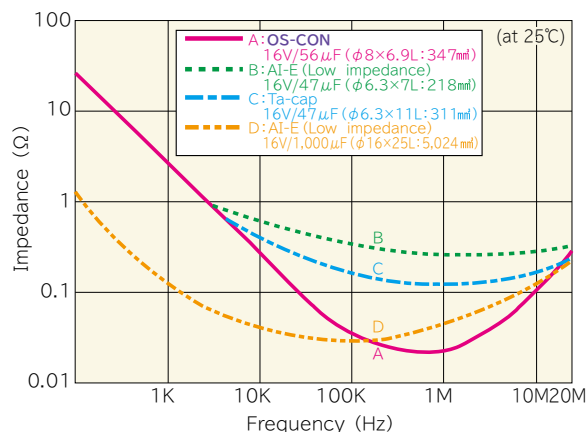
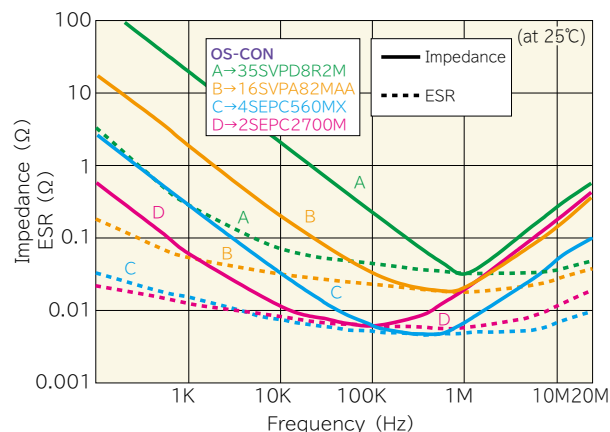


Fig.B Impedance & ESR frequency characteristics (several OS-CON models)



The OS-CON is an electrolytic capacitor that has excellent frequency characteristics. It improves ESR greatly, and provides the excellent frequency characteristics because the OS-CON uses a high conductive polymer as electrolyte. Fig.A: The OS-CON's frequency characteristic shows a nearly ideal curve. When compared at 100kHz, The OS-CON 56μF, and low impedance aluminum electrolytic capacitor 1,000μF nearly have the same feature. Fig.B: The resonance point of the OS-CON is at 100kHz to 10MHz. The ESR is an extremely small value approximately 5mΩ at 100kHz of 560μF.

1-2. Characteristics at high temperature and low temperature

Fig.A ESR temperature characteristics (OS-CON vs other types)

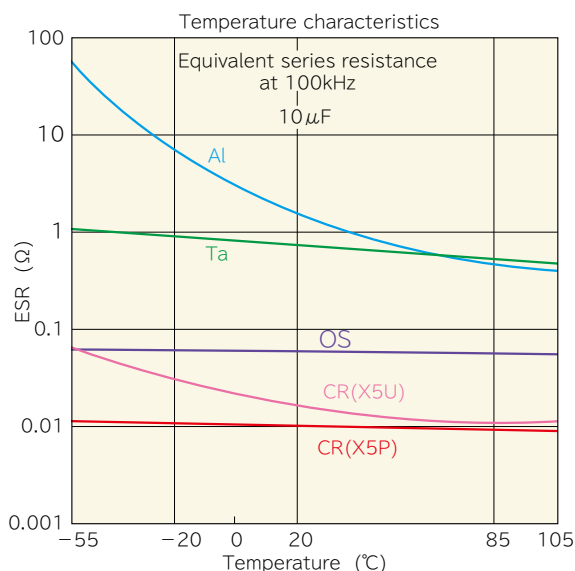
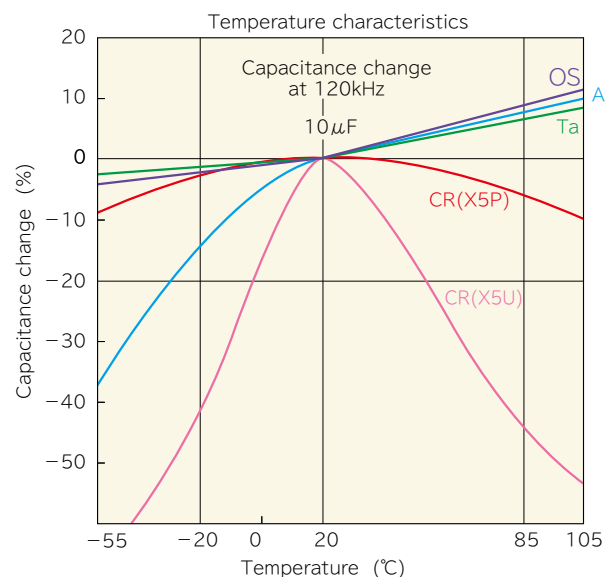


Fig.B Capacitance temperature characteristics (OS-CON vs other types)



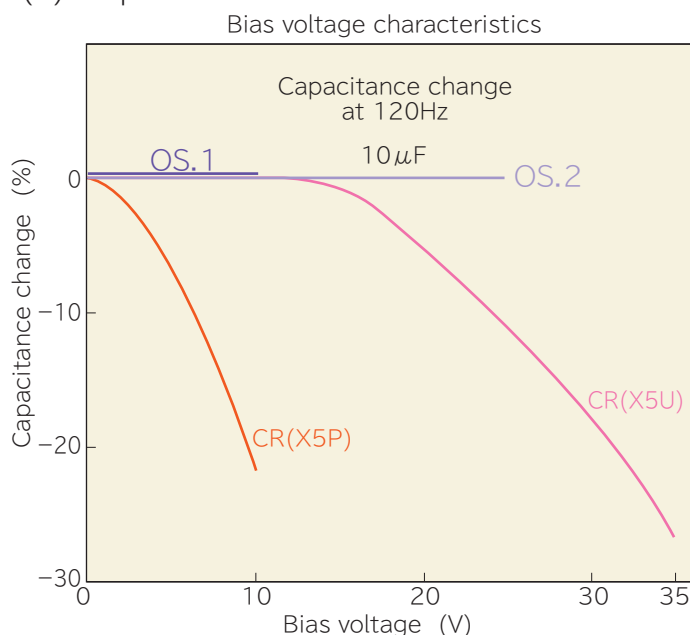
OS-CON's Characteristics at high temperature and low temperature is that it features little change in temperature for the ESR.

What ESR changes a little against temperature means that noise clearing ability changes a little against temperature as well. The OS-CON is suitable for outdoor apparatus.

OS = OS-CON ————— Purple
 AI = AL-E. Cap ————— Blue
 Ta = Tantalum Cap. ————— Green
 CR(X5P) = Cera Cap. (X5P Type) — Red
 CR(X5U) = Cera Cap. (X5U Type) — Pink

1-3. Bias characteristics

(a) Capacitance



OS.1 = **OS-CON**(10SVP10M) — Purple
 OS.2 = **OS-CON**(25SVPD10M) — Light Purple
 CR(X5P) = Cera Cap. — Red
 (X5P Type ; 10V/10 μ F)
 CR(X5U) = Cera Cap. — Pink
 (X5U Type ; 50V/10 μ F)

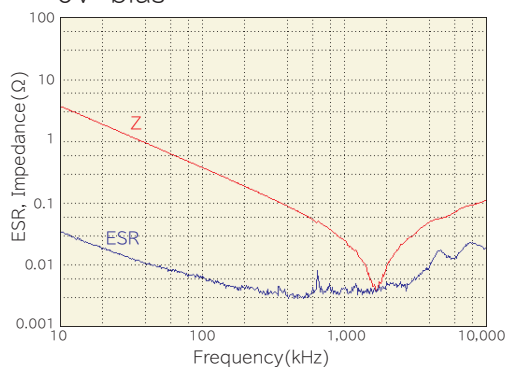
When voltage is applied to ceramic capacitors, they show a bias characteristics where static capacitance is reduced. Our **OS-CON** product, however, will show no reduction in capacitance for applied voltage within its rating.

(b) Impedance, ESR

Bias characteristics of **OS-CON** & ceramic capacitors

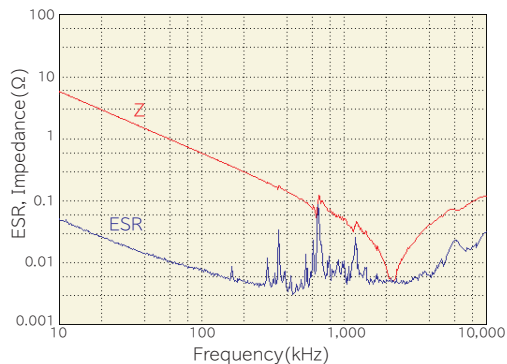
Multi-layer ceramic capacitor (25V/4.7 μ F)

0V bias



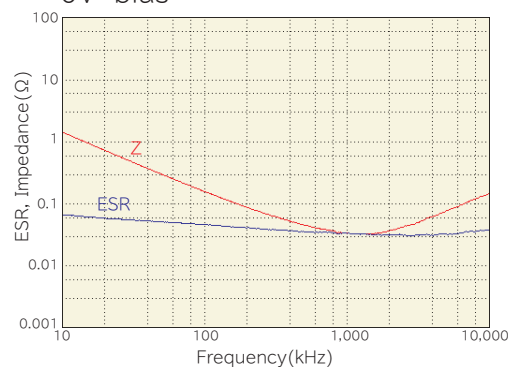
Multi-layer ceramic capacitor (25V/4.7 μ F)

20V bias



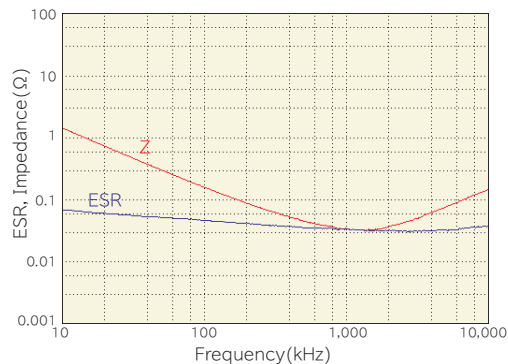
OS-CON (25SVPD10M)

0V bias



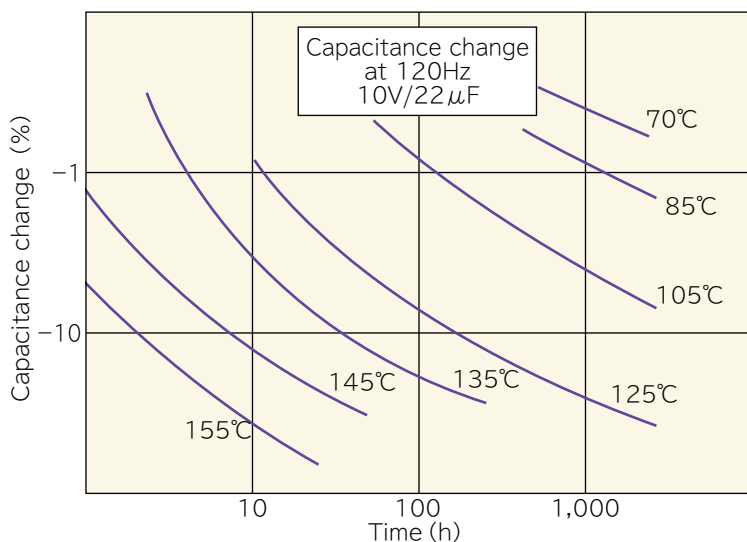
OS-CON (25SVPD10M)

20V bias



ESR & impedance of ceramic capacitors change largely between 300kHz to 1MHz. As for **OS-CON**, neither ESR nor impedance changes.

1. Temperature acceleration test (Endurance)



The decrease in capacitance of the **OS-CON** depends on temperature. The left figure shows the speed of capacitance decrease at each temperature. This graph indicates that temperature coefficient of the **OS-CON** lifetime is 10 times by 20°C reduction. Compared with this, aluminum capacitor lifetime is 2 times by 10°C reduction.

Estimation of life time

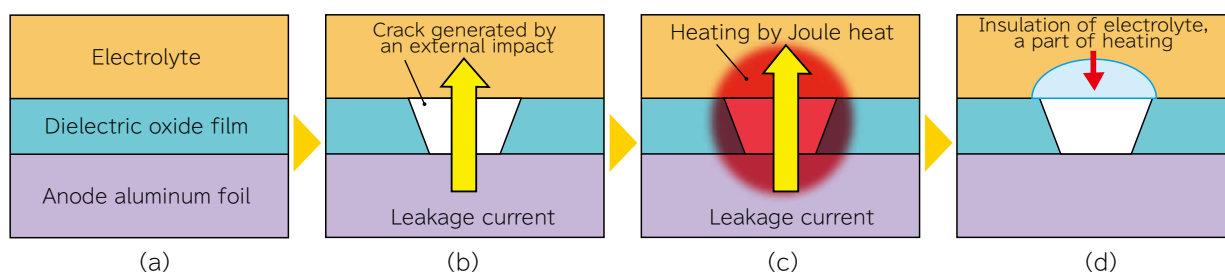
OS-CON	Aluminum electrolytic capacitor
105°C ⇒ 2,000h	105°C ⇒ 2,000h
95°C ⇒ 6,324h	95°C ⇒ 4,000h
85°C ⇒ 20,000h	85°C ⇒ 8,000h
75°C ⇒ 63,245h	75°C ⇒ 16,000h

※Guaranteed temperature of the **OS-CON** is 105°C, except for SEQP, SVQP and SVPD series.
 ※Time is an estimate, not guaranteed.

Though the **OS-CON** and an aluminum electrolytic capacitors are guaranteed on 2,000 hours at 105°C, the life span results in differences as temperature drops. The **OS-CON** has a longer life span compared with an aluminum electrolytic capacitor.

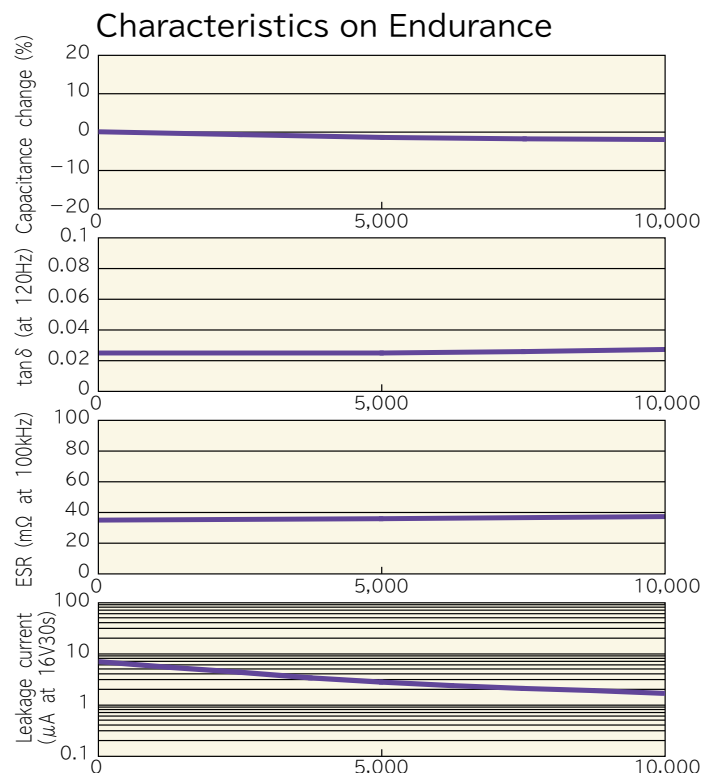
2. Self-Healing Mechanism

The dielectric substance of the **OS-CON** is a non-conductive oxide film that has formed on the surface of an anode aluminum foil. Since the oxide film is solid and thin, leakage current may temporarily increase if micro cracks are generated by external stress (i.e. mechanical, thermal, electrical) [see figure (b)]. When this happens, the leakage current generates Joule heat [see figure (c)] and with this heat the electrolyte turns non-conductive and insulates the outlet of the leakage path [see figure (d)]. The leakage current from the micro cracks is thus suppressed through this function. This is known as "self-healing mechanism."



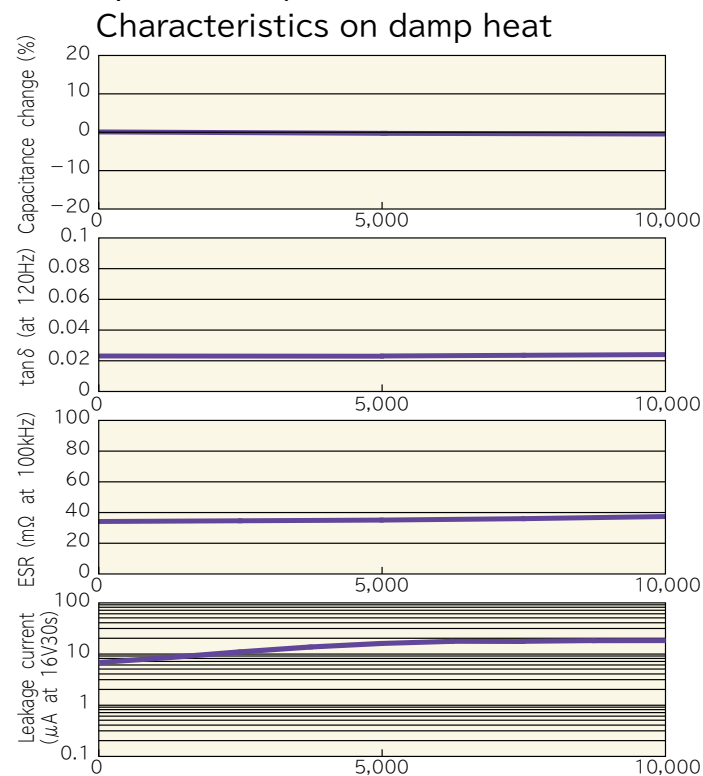
4. Conductive polymer type (16SVP39M)

4-1. Endurance (105°C, 16V applied)



Little change in characteristics can be seen after 10,000 hours because of adoption of conductive polymer that excels in thermal stability.

4-2. Damp heat (60°C90% RH, without load)



Little change in characteristics can be seen after 10,000h hours in a high temperature and damp heat environment because of the excellent thermal stability of conductive polymer.

Surface
mount type

SVPG Series

NEW



HS directive/Halogen-free compliant
Low ESR(8mΩ)
High rated ripple current(5,800mArms)

Specifications

Items	Condition	Specifications		
Rated voltage (V)	—	16	20	25
Surge voltage (V)	Room temperature	18	23	29
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※1	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 _{20°C}	0.75 to 1.25	
		+105°C Z/Z _{20°C}	0.75 to 1.25	
Endurance	105°C, 5,000h, Rated voltage applied	ΔC/C	Within ±20% of the initial value	
		DF	Within 1.5 times of the initial limit	
		ESR	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 1.5 times of the initial limit	
		ESR	Within 1.5 times of the initial limit	
		LC	Within the initial limit (after voltage processing)	
Resistance to soldering heat※2	VPS (230°C X 75s)	ΔC/C	Within ±10% of the initial value	
		DF	Within 1.3 times of the initial limit	
		ESR	Within 1.3 times of the initial limit	
		LC	Within the initial limit (after voltage processing)	

※1 In case of some problems for measured values, measure after applying rated voltage.

※2 Please refer to page 25 for reflow soldering conditions.

Marking and dimensions

Polarity marking (Cathode)		Case No. Series (PG)		Rated capacitance		Rated voltage	
003 PG 15 25							
0.2max		W		L		φD	
0.2max		H		R		P	
0.2max		C		R		P	
0.2max		C		R		P	
0.2max		C		R		P	
0.2max		C		R		P	
0.2max		C		R		P	
0.2max		C		R		P	

(unit : mm)

Size code	φD ±0.5	L ^{+0.1} _{-0.4}	W ±0.2	H ±0.2	C ±0.2	R	P ±0.2
B45	5.0	4.4	5.3	5.3	6.0	0.6~0.8	1.4
C10	6.3	9.9	6.6	6.6	7.3	0.6~0.8	2.1

Size list

RV : Rated voltage

RV	16	20	25
15			B45
33		B45	
47	B45		
270	C10		

Recommended land pattern dimension of PWB

Size code	a	b	c
B45	1.4	7.4	1.6
C10	2.1	9.1	1.6

(unit : mm)

SVPG series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20°C	Rated ripple current 100kHz (mArms) at 105°C	DF (% max)	Leakage current (μA) (max) After 2 minutes
B45	25SVPG15M	25	15	30	2800	12	75
	20SVPG33M	20	33	27	3000	12	132
	16SVPG47M	16	47	25	3200	12	150
C10	16SVPG270M	16	270	8	5800	12	864

Frequency coefficient for ripple current

Frequency	120Hz ≤ f < 1kHz	1kHz ≤ f < 10kHz	10kHz ≤ f < 100kHz	100kHz ≤ f ≤ 500kHz
Coefficient	0.05	0.3	0.7	1

OS-CON

OS-CON
Line-up

Guidelines and
precautions

Selection guide

Series system
diagram
Image of
case size
Products list
Packing
specifications
(SMD type)
Packing
specifications
(Radial lead type)

Technical data

Recommended
soldering
condition
Fundamental
structure
Characteristics
Reliability

Surface mount type

SVX
SVPG
SVPF
SVPE
SVPS
SVPD
SVPC
SVPB
SVPA
SVQP
SVP

Radial lead type

SXE
SEPF
SEPC
SEQP
SEP

Catalog Deletion and
EOL series

POSCAP

POSCAP
Line-up

Guidelines and
precautions

Selection guide

Technical data

Surface mount type

Surface mount type

Surface mount type

Catalog Deletion and
EOL models

SVPF series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20℃	Rated ripple current 100kHz (mA _{rms}) at 105℃	DF (% max)	Leakage current (μA) (max) After 2 minutes
B6	25SVPF27MX	25	27	40	2450	12	135
	20SVPF56MX	20	56	30	2800	12	224
	16SVPF82M	16	82	27	3000	12	262
C6	50SVPF10M	50	10	40	2500	12	100
	35SVPF22M	35	22	35	2600	12	154
	25SVPF47M	25	47	30	2800	12	235
	25SVPF56M	25	56	30	2800	12	280
	20SVPF120M	20	120	25	3200	12	480
	16SVPF180M	16	180	22	3300	12	576
E7	50SVPF18M	50	18	35	2700	12	180
	35SVPF39M	35	39	30	2800	12	273
	25SVPF82M	25	82	28	3000	12	410
	25SVPF100M	25	100	24	3200	12	500
	20SVPF180M	20	180	25	3200	12	720
	16SVPF270M	16	270	22	3300	12	864
E12	50SVPF39M	50	39	25	3800	12	390
	35SVPF82M	35	82	20	4000	12	574
	25SVPF180M	25	180	16	4650	12	900
	20SVPF390M	20	390	14	4950	12	1560
	16SVPF560M	16	560	14	4950	12	1792
F12	50SVPF68M	50	68	20	4300	12	680
	35SVPF120M	35	120	18	4400	12	840
	25SVPF330M	25	330	14	5000	12	1650
	20SVPF560M	20	560	12	5400	12	2240
	16SVPF1000M	16	1000	12	5400	12	3200

Recommended land pattern dimension of PWB

The diagram illustrates the recommended land pattern dimensions for a PWB. It shows a rectangular pad with a central hole of diameter U . The dimensions are defined as follows: a is the distance from the center of the hole to the edge of the pad, b is the total width of the pad, and c is the total height of the pad. The pad is shown in two orientations: horizontal and vertical.

(unit : mm)			
Size code	a	b	c
B6	1.4	7.4	1.6
C6	2.1	9.1	1.6
E7	2.8	11.1	1.9
E12	2.8	11.1	1.9
F12	4.3	13.1	1.9

Frequency coefficient for ripple current

Frequency	120Hz ≤ f < 1kHz	1kHz ≤ f < 10kHz	10kHz ≤ f < 100kHz	100kHz ≤ f ≤ 500kHz
Coefficient	0.05	0.3	0.7	1

SVPE series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max)		Rated ripple current 100kHz (mA rms) at 105℃	DF (% max)	Leakage current (μA) (max) After 2 minutes
				100kHz/20℃	300kHz/20℃※1			
B6	6SVPE150M	6.3	150	12	10	3520	12	500
	6SVPE180M	6.3	180	15	13	3150	12	500
	6SVPE220MW	6.3	220	15	13	3150	12	500
	2R5SVPE270M	2.5	270	10	9	3860	12	500
	2R5SVPE330M	2.5	330	15	13	3150	12	500
	2R5SVPE330MY	2.5	330	10	9	3860	12	500
	2R5SVPE390MX	2.5	390	10	9	3860	12	700
C6	10SVPE220M	10	220	20	18	2700	12	500
	6SVPE220M	6.3	220	10	9	3900	12	500
	2R5SVPE390M	2.5	390	10	9	3900	12	500
C10	16SVPE180M	16	180	11	10	4460	12	576
	2SVPE1200M	2.0	1200	8	8	5230	12	500
F12	16SVPE470M	16	470	10	9	6100	12	1504

※1 The ESR value in 300kHz is a reference one.

Recommended land pattern dimension of PWB

The diagram illustrates the recommended land pattern dimensions for a PWB. It shows a rectangular pad with a width of 'a' and a length of 'b'. The distance from the center of the pad to the edge of the PWB is 'c'. The total width of the PWB is 'U'.

(unit : mm)			
Size code	a	b	c
B6	1.4	7.4	1.6
C6	2.1	9.1	1.6
C10	2.1	9.1	1.6
F12	4.3	13.1	1.9

Frequency coefficient for ripple current

Frequency	120Hz ≤ f < 1kHz	1kHz ≤ f < 10kHz	10kHz ≤ f < 100kHz	100kHz ≤ f ≤ 500kHz
Coefficient	0.05	0.3	0.7	1

SVPS series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20℃	Allowable ripple current 100kHz (mA _{rms})※1	DF (% max)	Leakage current (μA)(max) After 2 minutes
A5	10SVPS10M	10	10	220	700	10	50
	10SVPS15M	10	15	200	740	10	75
	6SVPS22M	6.3	22	200	740	12	69.3
	4SVPS33M	4.0	33	200	740	15	66
B6	16SVPS22M	16	22	90	1060	10	176
	10SVPS33M	10	33	70	1100	12	165
	6SVPS47M	6.3	47	30	1970	12	300
	4SVPS68M	4.0	68	30	1970	12	300
C6	20SVPS22M	20	22	60	1450	10	88
	16SVPS39M	16	39	24	2460	12	300
	10SVPS68M	10	68	30	2200	12	300
	6SVPS120M	6.3	120	22	2570	12	300
	4SVPS150M	4.0	150	22	2570	12	300
E7	25SVPS10M	25	10	60	1500	10	125
	20SVPS47M	20	47	45	1890	12	188
	16SVPS82M	16	82	30	2760	12	262
	10SVPS150MX	10	150	30	2760	12	500
	6SVPS220M	6.3	220	22	3220	12	500
	4SVPS270M	4.0	270	22	3220	12	500
F8	16SVPS100M	16	100	35	2670	12	320
	16SVPS180M	16	180	29	3430	12	576
	10SVPS150M	10	150	30	3020	12	300
	10SVPS330M	10	330	24	3770	12	660
	6SVPS470M	6.3	470	20	4130	12	592
	4SVPS680M	4.0	680	20	4130	12	544

※1 The surface temperature of aluminum case top must not exceed 105℃. A rise in temperature due to self-heating by ripple current should be factored in.

Recommended land pattern dimension of PWB

(unit : mm)			
Size code	a	b	c
A5	1.0	6.2	1.6
B6	1.4	7.4	1.6
C6	2.1	9.1	1.6
E7	2.8	11.1	1.9
F8	4.3	13.1	1.9

Frequency coefficient for ripple current

Frequency	120Hz ≤ f < 1kHz	1kHz ≤ f < 10kHz	10kHz ≤ f < 100kHz	100kHz ≤ f ≤ 500kHz
Coefficient	0.05	0.3	0.7	1

SVPD series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20℃	Rated ripple current	Allowable ripple current	DF (% max)	Leakage current (μA)(max) After 2 minutes
					100kHz (mArms)			
					105℃<Tx≤125℃※1	Tx≤105℃※1		
C6	25SVPD10M	25	10	65	474	1500	10	50
	10SVPD56M	10	56	45	538	1700	12	112
E7	35SVPD8R2M	35	8.2	70	400	1300	10	57
	25SVPD22M	25	22	48	580	1835	10	110
	16SVPD82M	16	82	40	670	2120	12	262
F8	35SVPD18M	35	18	60	550	1800	10	126
	25SVPD39M	25	39	45	664	2100	10	195
E12	35SVPD22M	35	22	50	700	2300	12	154
	25SVPD47M	25	47	30	943	2980	12	235
F12	35SVPD47M	35	47	30	1150	3650	12	329
	25SVPD82M	25	82	28	1202	3800	12	410

※1 Tx : Ambient temperature

Recommended land pattern dimension of PWB

	(unit : mm)			
	Size code	a	b	c
	C6	2.1	9.1	1.6
	E7	2.8	11.1	1.9
	F8	4.3	13.1	1.9
	E12	2.8	11.1	1.9
	F12	4.3	13.1	1.9

Frequency coefficient for ripple current

Frequency	120Hz ≤ f < 1kHz	1kHz ≤ f < 10kHz	10kHz ≤ f < 100kHz	100kHz ≤ f ≤ 500kHz
Coefficient	0.05	0.3	0.7	1

SVPC series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR (mΩ) (max)		Rated ripple current 100kHz (mA rms) at 105°C	DF (% max)	Leakage current (μA) (max) After 2 minutes
				100kHz/20°C	300kHz/20°C※1			
B6	16SVPC39M	16	39	35	30	1820	12	300
	16SVPC39MV	16	39	27	23	2350	12	300
	10SVPC68M	10	68	30	26	1970	12	300
	10SVPC68MV	10	68	23	20	2540	12	300
	6SVPC100M	6.3	100	30	26	1970	12	300
	6SVPC100MY	6.3	100	25	21	2150	12	300
	6SVPC120MV	6.3	120	21	18	2660	12	300
	4SVPC150M	4.0	150	30	26	1970	12	300
	4SVPC150MY	4.0	150	23	20	2240	12	300
	4SVPC150MV	4.0	150	20	17	2730	12	300
	2R5SVPC180M	2.5	180	30	26	1970	12	300
	2R5SVPC180MY	2.5	180	24	20	2200	12	300
	2R5SVPC180MV	2.5	180	19	16	2800	12	300
C6	16SVPC68M	16	68	30	26	2200	12	300
	16SVPC68MV	16	68	25	22	2440	12	300
	16SVPC100M	16	100	24	23	2490	12	300
	10SVPC120M	10	120	27	23	2320	12	300
	10SVPC120MV	10	120	22	19	2600	12	300
	6SVPC220M	6.3	220	27	23	2320	12	300
	6SVPC220MV	6.3	220	15	13	3160	12	300
	6SVPC330M	6.3	330	17	15	3390	12	415
	4SVPC330M	4.0	330	27	23	2320	12	300
	4SVPC330MY	4.0	330	21	18	2630	12	300
	4SVPC330MV	4.0	330	15	13	3160	12	300
	2R5SVPC390M	2.5	390	25	22	2410	12	300
	2R5SVPC390MV	2.5	390	15	13	3160	12	300
	2R5SVPC560M	2.5	560	16	14	3500	12	300
E7	16SVPC120M	16	120	27	23	2900	12	500
	16SVPC150M	16	150	22	21	3220	12	500
	10SVPC270M	10	270	22	19	3220	12	500
	10SVPC330M	10	330	19	17	3460	12	660
	6SVPC390M	6.3	390	22	19	3220	12	491
	4SVPC560M	4.0	560	22	19	3220	12	500
	2R5SVPC680M	2.5	680	20	17	3370	12	500
E12	16SVPC270M	16	270	16	14	4070	15	864
	6SVPC820M	6.3	820	12	10	4700	15	1033
	4SVPC560MX	4.0	560	9	8	5380	15	500
	4SVPC1200M	4.0	1200	12	10	4700	15	960
	4SVPC1500M	4.0	1500	12	10	4700	15	1200
	2R5SVPC820M	2.5	820	9	8	5380	15	500
	2R5SVPC1500M	2.5	1500	10	9	5150	15	750
F12	2R5SVPC2700M	2.5	2700	12	10	5070	15	1350

※1 The ESR value in 300kHz is a reference one.

Recommended land pattern dimension of PWB

(unit : mm)			
Size code	a	b	c
B6	1.4	7.4	1.6
C6	2.1	9.1	1.6
E7	2.8	11.1	1.9
E12	2.8	11.1	1.9
F12	4.3	13.1	1.9

Frequency coefficient for ripple current

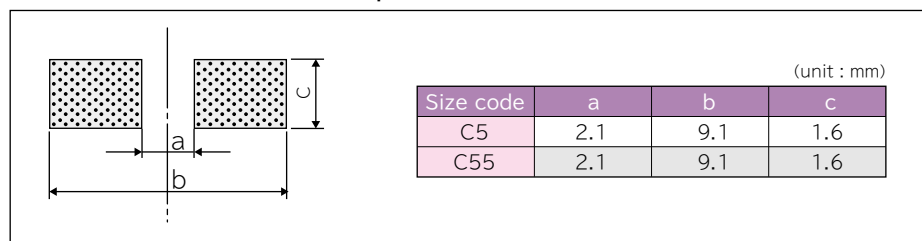
Frequency	120Hz ≤ f < 1kHz	1kHz ≤ f < 10kHz	10kHz ≤ f < 100kHz	100kHz ≤ f ≤ 500kHz
Coefficient	0.05	0.3	0.7	1

※ Red letters : New models

SVPB series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR (mΩ) (max) 100kHz to 300kHz/20°C	Rated ripple current 100kHz (mA _{rms}) at 105°C	DF (% max)	Leakage current (μA) (max) After 2 minutes
C5	20SVPB15M	20	15	45	2000	12	120
	16SVPB33M	16	33	40	1670	12	211
	10SVPB56M	10	56	40	1670	12	224
	6SVPB82M	6.3	82	40	1670	12	207
	4SVPB100M	4.0	100	40	1670	12	160
	2R5SVPB120M	2.5	120	40	1670	12	120
C55	20SVPB22M	20	22	35	2000	12	88

Recommended land pattern dimension of PWB



Frequency coefficient for ripple current

Frequency	120Hz ≤ f < 1kHz	1kHz ≤ f < 10kHz	10kHz ≤ f < 100kHz	100kHz ≤ f ≤ 500kHz
Coefficient	0.05	0.3	0.7	1

Surface mount type

SVPA Series



RoHS directive/Halogen-free compliant
Low ESR 18mΩ
High rated ripple current (4,240mA_{rms})

Specifications

Items	Condition			Specifications					
Rated voltage (V)	—			2.5	4.0	6.3	10	16	20
Surge voltage (V)	Room temperature			3.3	5.2	8.2	12	18	23
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※1	Rated voltage applied, after 2 minutes			Please see the attached characteristics list					
Equivalent series resistance (ESR)	100kHz/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 _{20°C}	0.75 to 1.25					
		+105°C	Z/Z _{20°C}	0.75 to 1.25					
Endurance	105°C, 2,000h, Rated voltage applied	ΔC/C		Within ±20% of the initial value					
		DF		Within 1.5 times of the initial limit					
		ESR		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 1.5 times of the initial limit					
		ESR		Within 1.5 times of the initial limit					
		LC		Within the initial limit (after voltage processing)					
Resistance to soldering heat※2	VPS (230°C X 75s)	ΔC/C		Within ±10% of the initial value					
		DF		Within 1.3 times of the initial limit					
		ESR		Within 1.3 times of the initial limit					
		LC		Within the initial limit (after voltage processing)					

※1 In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 105°C.

※2 Please refer to page 25 for reflow soldering conditions.

Marking and dimensions

Figure 1: Dimensions and Markings of the SVPA Series

Markings:

- Polarity marking (Cathode): 003, SVPA, 47, 20
- Case No.
- Series: (B6, C6 size is) PA, E7, F8 (size is)
- Rated capacitance
- Rated voltage

Dimensions (unit: mm):

- ϕD : Diameter
- L: Length
- H: Height
- W: Width
- C: Case width
- R: Radius
- P: Pitch
- 0.2max: Thickness

Size code	$\phi D \pm 0.5$	$L \begin{smallmatrix} +0.1 \\ -0.4 \end{smallmatrix}$	$W \pm 0.2$	$H \pm 0.2$	$C \pm 0.2$	R	$P \pm 0.2$
B6	5.0	5.9	5.3	5.3	6.0	0.6~0.8	1.4
C6	6.3	5.9	6.6	6.6	7.3	0.6~0.8	2.1
E7	8.0	6.9	8.3	8.3	9.0	0.6~0.8	3.2
F8	10.0	7.9	10.3	10.3	11.0	0.6~0.8	4.6

Size list

RV : Rated voltage

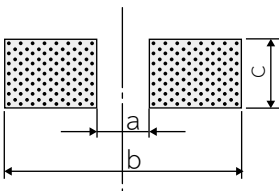
RV μF	2.5	4.0	6.3	10	16	20
10						B6
22						C6
39					C6	
47			B6			E7
68		B6		C6		
82	B6				E7	
120			C6			
150		C6		E7		
180	C6				F8	
220			E7			
270		E7				
330	E7			F8		
470			F8			
680		F8				
820	F8					

SVPA series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR (mΩ) (max)		Rated ripple current 100kHz (mA _{rms}) at 105°C	DF (% max)	Leakage current (μA)(max) After 2 minutes
				100kHz/20°C	300kHz/20°C※1			
B6	20SVPA10M	20	10	40	35	1700	12	80
	6SVPA47MAA	6.3	47	30	26	1970	12	300
	4SVPA68MAA	4.0	68	30	26	1970	12	300
	2R5SVPA82MAA	2.5	82	30	26	1970	12	300
C6	20SVPA22M	20	22	35	31	2040	12	88
	16SVPA39MAA	16	39	35	31	2040	12	300
	16SVPA39MAAY	16	39	24	20	2460	12	300
	10SVPA68MAA	10	68	30	26	2200	12	300
	6SVPA120MAA	6.3	120	22	19	2570	12	300
	4SVPA150MAA	4.0	150	22	19	2570	12	300
	2R5SVPA180MAA	2.5	180	20	18	2690	12	300
E7	20SVPA47M	20	47	33	29	2630	12	188
	16SVPA82MAA	16	82	30	25	2760	12	262
	10SVPA150MAA	10	150	30	25	2760	12	500
	6SVPA220MAA	6.3	220	22	19	3220	12	500
	4SVPA270MAA	4.0	270	22	19	3220	12	500
	2R5SVPA330MAA	2.5	330	20	18	3370	12	500
F8	16SVPA180M	16	180	29	28	3430	12	576
	10SVPA330M	10	330	24	23	3770	12	660
	6SVPA470M	6.3	470	20	19	4130	12	592
	4SVPA680M	4.0	680	20	19	4130	12	544
	2R5SVPA820M	2.5	820	19	18	4240	12	500

※1 The ESR value at 300kHz is a reference one.

Recommended land pattern dimension of PWB

(unit : mm)			
	Size code	a	b
	B6	1.4	7.4
	C6	2.1	9.1
	E7	2.8	11.1
	F8	4.3	13.1

Frequency coefficient for ripple current

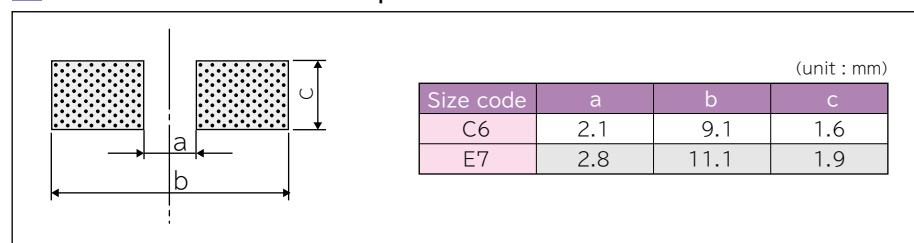
Frequency	120Hz ≤ f < 1kHz	1kHz ≤ f < 10kHz	10kHz ≤ f < 100kHz	100kHz ≤ f ≤ 500kHz
Coefficient	0.05	0.3	0.7	1

SVQP series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20℃	Rated ripple current	Allowable ripple current	DF (% max)	Leakage current (μA)(max) After 2 minutes
					100kHz (mA _{rms})			
					105℃<T _x ≤125℃※1	T _x ≤105℃※1		
C6	20SVQP22M	20	22	60	459	1450	10	220
	16SVQP39M	16	39	50	512	1620	10	312
	10SVQP56M	10	56	45	538	1700	12	280
	6SVQP82M	6.3	82	45	538	1700	12	258
	6SVQP100M	6.3	100	40	572	1810	12	315
	4SVQP150M	4.0	150	40	572	1810	12	300
E7	20SVQP47M	20	47	45	598	1890	12	470
	16SVQP82M	16	82	40	670	2120	12	656
	10SVQP120M	10	120	35	810	2560	12	600
	10SVQP150M	10	150	35	810	2560	12	750
	6SVQP220M	6.3	220	35	810	2560	12	693

※1 T_x: Ambient temperature

Recommended land pattern dimension of PWB



Frequency coefficient for ripple current

Frequency	120Hz≤ f <1kHz	1kHz≤ f <10kHz	10kHz≤ f <100kHz	100kHz≤ f ≤500kHz
Coefficient	0.05	0.3	0.7	1

SVP series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20°C	Rated ripple current 100kHz (mA _{rms}) at 105°C	DF (% max)	Leakage current (μA) (max) After 2 minutes
A5	16SVP3R3M	16	3.3	260	660	7.0	26.4
	10SVP4R7M	10	4.7	240	670	8.0	23.5
	10SVP6R8M	10	6.8	240	670	9.0	34
	10SVP10M	10	10	220	700	10	50
	10SVP15M	10	15	200	740	10	75
	6SVP22M	6.3	22	200	740	12	69.3
	4SVP33M	4.0	33	200	740	15	66
B6	20SVP10M	20	10	120	1020	10	100
	16SVP15M	16	15	120	1020	10	120
	16SVP22M	16	22	90	1060	10	176
	10SVP33M	10	33	70	1100	12	165
	6SVP47M	6.3	47	70	1100	12	148
	4SVP39M	4.0	39	70	1100	12	78
	4SVP68M	4.0	68	60	1400	12	136
C6	20SVP22M	20	22	60	1450	10	88
	20SVP27M	20	27	60	1450	10	108
	16SVP39M	16	39	50	1620	10	125
	10SVP47M	10	47	50	1620	12	94
	10SVP56M	10	56	45	1700	12	112
	6SVP82M	6.3	82	45	1700	12	103
	6SVP100M	6.3	100	40	1810	12	126
	6SVP120MV	6.3	120	17	2780	12	151
	4SVP150MX	4.0	150	40	1810	12	120
	2R5SVP220M	2.5	220	23	2390	12	110
E7	20SVP33M	20	33	45	1890	12	132
	20SVP47M	20	47	45	1890	12	188
	16SVP56M	16	56	45	1890	12	179
	16SVP82M	16	82	40	2120	12	262
	10SVP120M	10	120	35	2560	12	240
	10SVP150MX	10	150	35	2560	12	300
	6SVP220MX	6.3	220	35	2560	12	277
	4SVP330M	4.0	330	35	2560	12	264
F8	20SVP56M	20	56	40	2400	12	224
	20SVP68M	20	68	40	2400	12	272
	16SVP100M	16	100	35	2670	12	320
	16SVP150M	16	150	30	3020	12	480
	16SVP180MX	16	180	30	3020	12	576
	10SVP150M	10	150	30	3020	12	300
	10SVP270M	10	270	25	3700	12	540
	10SVP330MX	10	330	25	3700	12	660
	6SVP220M	6.3	220	25	3700	12	277
	6SVP330M	6.3	330	25	3700	12	416
E12	6SVP470MX	6.3	470	25	3700	12	592
	4SVP680M	4.0	680	25	3700	12	544
	20SVP100M	20	100	24	3320	15	400
	16SVP180M	16	180	20	3640	15	576
	10SVP330M	10	330	17	3950	15	660
	6SVP470M	6.3	470	15	4210	15	592
F12	4SVP560M	4.0	560	13	4520	15	448
	2R5SVP680M	2.5	680	13	4520	15	340
	20SVP150M	20	150	20	4320	15	600
	16SVP330M	16	330	16	4720	15	792
	10SVP560M	10	560	13	5230	15	840
	6SVP820M	6.3	820	12	5440	15	775
	4SVP1200M	4.0	1200	12	5440	18	960
	2R5SVP1500M	2.5	1500	12	5440	18	750

Frequency coefficient for ripple current

Frequency	120Hz ≤ f < 1kHz	1kHz ≤ f < 10kHz	10kHz ≤ f < 100kHz	100kHz ≤ f ≤ 500kHz
Coefficient	0.05	0.3	0.7	1



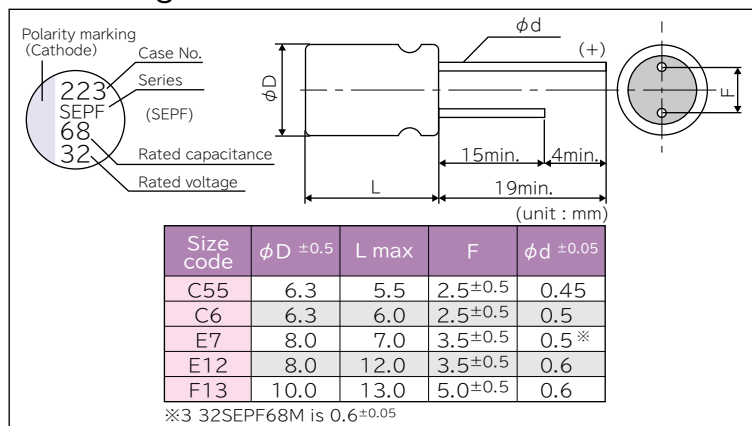
Specifications

Items	Condition	Specifications				
Rated voltage (V)	—	16	20	25	32	35
Surge voltage (V)	Room temperature	18	23	29	37	40
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※1	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 _{20°C}	0.75 to 1.25		
		+105°C	Z/Z _{20°C}	0.75 to 1.25		
Endurance	105°C, 5,000h, Rated voltage applied	ΔC/C	Within ±20% of the initial value			
		DF	Within 1.5 times of the initial limit			
		ESR	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 1.5 times of the initial limit			
		ESR	Within 1.5 times of the initial limit			
		LC	Within the initial limit (after voltage processing)			
Resistance to soldering heat※2	Flow method (260±5°C X 10s)	ΔC/C	Within ±5% of the initial value			
		DF	Within the initial limit			
		ESR	Within the initial limit			
		LC	Within the initial limit (after voltage processing)			

 ※1 In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 105 $^{\circ}$ C.

※2 Please refer to page 25 for flow soldering conditions.

Marking and dimensions



Size list

RV : Rated voltage

μ F	RV	16	20	25	32	35
22					C55	C6
39						E7
56					C6	
68					E7	
82				E7		E12
120		C6				F13
150	C55					
180	C6	E7	E12			
270	E7					
330			F13			
390			E12			
560	E12	F13				
1,000	F13					

SEPF series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μ F)	ESR(m Ω) (max) 100kHz to 300kHz/20 $^{\circ}$ C	Rated ripple current 100kHz (mA _{RMS}) at 105 $^{\circ}$ C	DF (% max)	Leakage current (μ A) (max) After 2 minutes
C55	32SEPF22M	32	22	35	2400	12	140
	16SEPF150M	16	150	30	2590	12	480
C6	35SEPF22M	35	22	35	2600	12	154
	25SEPF56M	25	56	30	2800	12	280
	20SEPF120M	20	120	25	3200	12	480
	16SEPF180M	16	180	22	3300	12	576
E7	35SEPF39M	35	39	30	2800	12	273
	32SEPF68M	32	68	25	3200	10	435
	25SEPF82M	25	82	28	3000	12	410
	20SEPF180M	20	180	25	3200	12	720
	16SEPF270M	16	270	22	3300	12	864
E12	35SEPF82M	35	82	20	4000	12	574
	25SEPF180M	25	180	16	4650	12	900
	20SEPF390M	20	390	14	4950	12	1560
	16SEPF560M	16	560	14	4950	12	1792
F13	35SEPF120M	35	120	18	4400	12	840
	25SEPF330M	25	330	14	5000	12	1650
	20SEPF560M	20	560	12	5400	12	2240
	16SEPF1000M	16	1000	12	5400	12	3200

Frequency coefficient for ripple current

Frequency	120Hz $\leq$ f <1kHz	1kHz $\leq$ f <10kHz	10kHz $\leq$ f <100kHz	100kHz $\leq$ f $\leq$ 500kHz
Coefficient	0.05	0.3	0.7	1

SEPC series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20°C	Rated ripple current 100kHz (mA _{rms}) at 105°C	DF (% max)	Leakage current (μA)(max) After 2 minutes
B9	2SEPC100MZ	2.5	100	7	4180	10	500
	2SEPC330MZ	2.5	330	7	4180	10	500
	2SEPC470MZ	2.5	470	7	4180	10	500
	2SEPC560MZ	2.5	560	7	4180	10	500
C55	6SEPC220M	6.3	220	18	2980	12	280
C6	16SEPC100M	16	100	24	2490	10	320
	2SEPC390M	2.5	390	10	3900	12	500
	2SEPC560M	2.5	560	10	3900	12	500
C7	6SEPC470ME	6.3	470	20	2970	10	592
C9	16SEPC100MW	16	100	10	4680	10	500
	6SEPC470MW	6.3	470	7	5600	10	592
	6SEPC560MW	6.3	560	7	5600	10	705
	4SEPC560MW	4.0	560	7	5600	10	500
	2SEPC330MW	2.5	330	7	5600	10	500
	2SEPC560MW	2.5	560	7	5600	10	500
	2SEPC820MW	2.5	820	7	5600	10	500
E7	16SEPC150MD	16	150	22	3220	12	500
	16SEPC220MD	16	220	13	4150	10	500
	10SEPC270MD	10	270	22	3220	12	500
	2SEPC820MD	2.5	820	8	5300	10	500
	6SEPC1000MD	6.3	1000	18	3530	10	1260
E9	16SEPC180MX	16	180	10	5000	10	576
	16SEPC270MX	16	270	10	5000	10	864
	6SEPC470MX	6.3	470	8	5700	10	592
	6SEPC560MX	6.3	560	7	6100	10	705
	4SEPC560MX	4.0	560	7	6100	10	500
	2SEPC560MX	2.5	560	8	4700	10	280
	2SEPC820MX	2.5	820	7	6100	10	500
	2SEPC820MY	2.5	820	5	7200	10	500
	2SEPC1000MX	2.5	1000	7	6100	10	500
E12	16SEPC180M	16	180	16	4360	10	576
	16SEPC270M	16	270	11	5000	10	864
E13	6SEPC470M	6.3	470	8	5700	10	592
	4SEPC560M	4.0	560	7	6100	10	500
	4SEPC680M	4.0	680	7	6100	10	544
	2R5SEPC820M	2.5	820	7	6100	10	500
F13	16SEPC470M	16	470	10	6100	10	1504
	6SEPC680M	6.3	680	7	6640	10	857
	6SEPC1500M	6.3	1500	10	5560	10	1890
	4SEPC820M	4.0	820	7	6640	10	656
	2SEPC2700M	2.5	2700	10	5560	10	1350

Frequency coefficient for ripple current

Frequency	120Hz ≤ f < 1kHz	1kHz ≤ f < 10kHz	10kHz ≤ f < 100kHz	100kHz ≤ f ≤ 500kHz
Coefficient	0.05	0.3	0.7	1

※ Red letters : New models

SEQP series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20℃	Rated ripple current	Allowable ripple current	DF (% max)	Leakage current (μA) (max) After 2 minutes
					100kHz (mA _{rms})			
					105℃<T _x ≤125℃※1	T _x ≤105℃※1		
C6	20SEQP22M	20	22	60	458	1450	10	220
	16SEQP39M	16	39	50	512	1620	10	312
	10SEQP56M	10	56	45	537	1700	12	280
	6SEQP82M	6.3	82	45	537	1700	12	258
	4SEQP150M	4.0	150	40	572	1810	12	300
E7	32SEQP6R8M	32	6.8	100	440	1400	10	44
	20SEQP47M	20	47	45	598	1890	12	470
	16SEQP82M	16	82	40	670	2120	12	656
	10SEQP120M	10	120	35	810	2560	12	600
	6SEQP150M	6.3	150	35	810	2560	12	472
	4SEQP330M	4.0	330	35	810	2560	12	660
F8	32SEQP15M	32	15	80	560	1800	10	96
	20SEQP68M	20	68	40	759	2400	12	272
	16SEQP150M	16	150	30	955	3020	12	480
	10SEQP270M	10	270	25	1170	3700	12	540
	6SEQP330M	6.3	330	25	1170	3700	12	416
	4SEQP680M	4.0	680	25	1170	3700	12	544
E12	32SEQP18M	32	18	50	790	2500	12	115
	20SEQP100M	20	100	24	1050	3320	15	400
	16SEQP180M	16	180	20	1151	3640	15	576
	10SEQP330M	10	330	17	1250	3950	15	660
	6SEQP470M	6.3	470	15	1332	4210	15	592
	4SEQP560M	4.0	560	13	1430	4520	15	448
F13	20SEQP150M	20	150	20	1367	4320	15	600
	16SEQP330M	16	330	16	1493	4720	15	792
	10SEQP560M	10	560	13	1655	5230	15	840
	6SEQP820M	6.3	820	12	1721	5440	15	775
	4SEQP1200M	4.0	1200	12	1721	5440	18	960

※1 T_x : Ambient temperature

Frequency coefficient for ripple current

Frequency	120Hz≤ f <1kHz	1kHz≤ f <10kHz	10kHz≤ f <100kHz	100kHz≤ f ≤500kHz
Coefficient	0.05	0.3	0.7	1

OS-CON OS-CON Line-up Guidelines and precautions Series system diagram Image of case size Products list Packing specifications (SMD type) Packing specifications (Radial lead type) Recommended soldering condition Fundamental structure Characteristics Reliability Catalog Deletion and EOL series	Radial lead type	SEP Series 	RoHS directive/Halogen-free compliant Standard of Radial Lead Type Endurance: 105°C 3,000h	Specifications	<table> <tr> <th colspan="2">Items</th><th colspan="2">Condition</th><th colspan="7">Specifications</th></tr> <tr> <td>Rated voltage</td><td>(V)</td><td colspan="2">—</td><td>2.5</td><td>4.0</td><td>6.3</td><td>10</td><td>16</td><td>20</td><td></td></tr> <tr> <td>Surge voltage</td><td>(V)</td><td colspan="2">Room temperature</td><td>3.3</td><td>5.2</td><td>8.2</td><td>12</td><td>18</td><td>23</td><td></td></tr> <tr> <td>Category temperature range</td><td>(°C)</td><td colspan="2">—</td><td colspan="7">-55 to +105</td></tr> <tr> <td>Capacitance tolerance</td><td>(%)</td><td colspan="2">120Hz/20°C</td><td colspan="7">M : ±20</td></tr> <tr> <td>Dissipation Factor (DF)</td><td></td><td colspan="2">120Hz/20°C</td><td colspan="7">Please see the attached characteristics list</td></tr> <tr> <td>Leakage current※1</td><td></td><td colspan="2">Rated voltage applied, after 2 minutes</td><td colspan="7">Please see the attached characteristics list</td></tr> <tr> <td>Equivalent series resistance (ESR)</td><td></td><td colspan="2">100kHz to 300kHz/20°C</td><td colspan="7">Please see the attached characteristics list</td></tr> <tr> <td rowspan="4">Characteristics of impedance ratio at high temp. and low temp.</td><td rowspan="4"></td><td rowspan="4">Based the value at 100kHz, +20°C</td><td>-55°C</td><td>Z/Z20°C</td><td colspan="6">0.75 to 1.25</td></tr> <tr> <td>+105°C</td><td>Z/Z20°C</td><td colspan="6">0.75 to 1.25</td></tr> <tr> <td colspan="2">ΔC/C</td><td colspan="6">Within ±20% of the initial value</td></tr> <tr> <td colspan="2">DF</td><td colspan="6">Within 1.5 times of the initial limit</td></tr> <tr> <td rowspan="4">Endurance</td><td rowspan="4"></td><td rowspan="4">105°C, 3,000h, Rated voltage applied (2.5V → 2,000h)</td><td colspan="2">ESR</td><td colspan="6">Within 1.5 times of the initial limit</td></tr> <tr> <td colspan="2">LC</td><td colspan="6">Within the initial limit</td></tr> <tr> <td colspan="2">ΔC/C</td><td colspan="6">Within ±20% of the initial value</td></tr> <tr> <td colspan="2">DF</td><td colspan="6">Within 1.5 times of the initial limit</td></tr> <tr> <td rowspan="4">Damp heat(Steady state)</td><td rowspan="4"></td><td rowspan="4">60°C, 90 to 95%RH, 1,000h, No-applied voltage</td><td colspan="2">ESR</td><td colspan="6">Within 1.5 times of the initial limit</td></tr> <tr> <td colspan="2">LC</td><td colspan="6">Within the initial limit (after voltage processing)</td></tr> <tr> <td colspan="2">ΔC/C</td><td colspan="6">Within ±5% of the initial value</td></tr> <tr> <td colspan="2">DF</td><td colspan="6">Within the initial limit</td></tr> <tr> <td rowspan="4">Resistance to soldering heat※2</td><td rowspan="4"></td><td rowspan="4">Flow method (260±5°C X 10s)</td><td colspan="2">ESR</td><td colspan="6">Within the initial limit</td></tr> <tr> <td colspan="2">LC</td><td colspan="6">Within the initial limit (after voltage processing)</td></tr> <tr> <td colspan="2">ΔC/C</td><td colspan="6">Within ±5% of the initial value</td></tr> <tr> <td colspan="2">DF</td><td colspan="6">Within the initial limit</td></tr> </table> ※1 In case of some problems for measured values, measure after applying rated voltage. ※2 Please refer to page 25 for flow soldering conditions.	Items		Condition		Specifications							Rated voltage	(V)	—		2.5	4.0	6.3	10	16	20		Surge voltage	(V)	Room temperature		3.3	5.2	8.2	12	18	23		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※1		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/Z20°C	0.75 to 1.25						+105°C	Z/Z20°C	0.75 to 1.25						ΔC/C		Within ±20% of the initial value						DF		Within 1.5 times of the initial limit						Endurance		105°C, 3,000h, Rated voltage applied (2.5V → 2,000h)	ESR		Within 1.5 times of the initial limit						LC		Within the initial limit						ΔC/C		Within ±20% of the initial value						DF		Within 1.5 times of the initial limit						Damp heat(Steady state)		60°C, 90 to 95%RH, 1,000h, No-applied voltage	ESR		Within 1.5 times of the initial limit						LC		Within the initial limit (after voltage processing)						ΔC/C		Within ±5% of the initial value						DF		Within the initial limit						Resistance to soldering heat※2		Flow method (260±5°C X 10s)	ESR		Within the initial limit						LC		Within the initial limit (after voltage processing)						ΔC/C		Within ±5% of the initial value						DF		Within the initial limit						Marking and dimensions	Polarity marking (Cathode) Case No. Series (SEP) Rated capacitance Rated voltage 003 SEP 820 6 φD L φd 15min. 4min. 19min. (+) (unit : mm) <table> <tr> <th>Size code</th><th>φD ±0.5</th><th>L max</th><th>F</th><th>φd ±0.05</th></tr> <tr> <td>C6</td><td>6.3</td><td>6.0</td><td>2.5±0.5</td><td>0.45</td></tr> <tr> <td>E7</td><td>8.0</td><td>7.0</td><td>3.5±0.5</td><td>0.45</td></tr> <tr> <td>F8</td><td>10.0</td><td>8.0</td><td>5.0±0.5</td><td>0.50</td></tr> <tr> <td>E12</td><td>8.0</td><td>12.0</td><td>3.5±0.5</td><td>0.60</td></tr> <tr> <td>F13</td><td>10.0</td><td>13.0</td><td>5.0±0.5</td><td>0.60</td></tr> </table>	Size code	φD ±0.5	L max	F	φd ±0.05	C6	6.3	6.0	2.5±0.5	0.45	E7	8.0	7.0	3.5±0.5	0.45	F8	10.0	8.0	5.0±0.5	0.50	E12	8.0	12.0	3.5±0.5	0.60	F13	10.0	13.0	5.0±0.5	0.60	Size list	RV : Rated voltage	<table> <tr> <th>μF \ RV</th><th>2.5</th><th>4.0</th><th>6.3</th><th>10</th><th>16</th><th>20</th></tr> <tr> <td>22</td><td></td><td></td><td></td><td></td><td></td><td>C6</td></tr> <tr> <td>33</td><td></td><td></td><td></td><td></td><td></td><td>E7</td></tr> <tr> <td>39</td><td></td><td></td><td></td><td></td><td>C6</td><td></td></tr> <tr> <td>47</td><td></td><td></td><td></td><td></td><td></td><td>E7</td></tr> <tr> <td>56</td><td></td><td></td><td></td><td>C6</td><td></td><td>F8</td></tr> <tr> <td>68</td><td></td><td></td><td></td><td></td><td></td><td>F8</td></tr> <tr> <td>82</td><td></td><td></td><td>C6</td><td></td><td>E7</td><td></td></tr> <tr> <td>100</td><td></td><td>C6</td><td></td><td></td><td></td><td>F8、E12</td></tr> <tr> <td>120</td><td></td><td></td><td></td><td>E7</td><td></td><td></td></tr> <tr> <td>150</td><td></td><td>C6</td><td>E7</td><td></td><td>F8</td><td>F13</td></tr> <tr> <td>180</td><td></td><td></td><td></td><td></td><td>E12</td><td></td></tr> <tr> <td>220</td><td></td><td>E7</td><td></td><td></td><td></td><td></td></tr> <tr> <td>270</td><td></td><td></td><td></td><td>F8</td><td></td><td></td></tr> <tr> <td>330</td><td></td><td>E7</td><td>F8</td><td>E12</td><td>F13</td><td></td></tr> <tr> <td>470</td><td></td><td>F8</td><td>E12</td><td></td><td></td><td></td></tr> <tr> <td>560</td><td></td><td>E12</td><td></td><td>F13</td><td></td><td></td></tr> <tr> <td>680</td><td>E12</td><td>F8</td><td></td><td></td><td></td><td></td></tr> <tr> <td>820</td><td></td><td></td><td>F13</td><td></td><td></td><td></td></tr> <tr> <td>1,200</td><td></td><td>F13</td><td></td><td></td><td></td><td></td></tr> <tr> <td>1,500</td><td>F13</td><td></td><td></td><td></td><td></td><td></td></tr> </table>	μF \ RV	2.5	4.0	6.3	10	16	20	22						C6	33						E7	39					C6		47						E7	56				C6		F8	68						F8	82			C6		E7		100		C6				F8、E12	120				E7			150		C6	E7		F8	F13	180					E12		220		E7					270				F8			330		E7	F8	E12	F13		470		F8	E12				560		E12		F13			680	E12	F8					820			F13				1,200		F13					1,500	F13					
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F13	10.0	13.0	5.0±0.5	0.60																																																																																																																																																																																																																																																																																																																																																																																																																											
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SEP series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20°C	Rated ripple current 100kHz (mA _{rms}) at 105°C	DF (% max)	Leakage current (μA) (max) After 2 minutes
C6	20SEP22M	20	22	60	1450	10	220
	16SEP39M	16	39	50	1620	10	312
	10SEP56M	10	56	45	1700	12	280
	6SEP82M	6.3	82	45	1700	12	258
	4SEP100M	4.0	100	40	1810	12	200
	4SEP150M	4.0	150	40	1810	12	300
E7	20SEP33M	20	33	45	1890	12	330
	20SEP47M	20	47	45	1890	12	470
	16SEP82M	16	82	40	2120	12	656
	10SEP120M	10	120	35	2560	12	600
	6SEP150M	6.3	150	35	2560	12	472
	4SEP220M	4.0	220	35	2560	12	440
	4SEP330M	4.0	330	35	2560	12	660
	4SEP330M	4.0	330	35	2560	12	660
F8	20SEP56M	20	56	40	2400	12	224
	20SEP68M	20	68	40	2400	12	272
	20SEP100MX	20	100	35	2570	12	400
	16SEP150M	16	150	30	3020	12	480
	10SEP270M	10	270	25	3700	12	540
	6SEP330M	6.3	330	25	3700	12	416
	4SEP470M	4.0	470	25	3700	12	376
	4SEP680M	4.0	680	25	3700	12	544
E12	20SEP100M	20	100	24	3320	15	400
	16SEP180M	16	180	20	3640	15	576
	10SEP330M	10	330	17	3950	15	660
	6SEP470M	6.3	470	15	4210	15	592
	4SEP560M	4.0	560	13	4520	15	448
	2R5SEP680M	2.5	680	13	4520	15	340
	2R5SEP680M	2.5	680	13	4520	15	340
F13	20SEP150M	20	150	20	4320	15	600
	16SEP330M	16	330	16	4720	15	792
	10SEP560M	10	560	13	5230	15	840
	6SEP820M	6.3	820	12	5440	15	775
	4SEP1200M	4.0	1200	12	5440	18	960
	2R5SEP1500M	2.5	1500	12	5440	18	750

※1 Tx : Ambient temperature

Frequency coefficient for ripple current

Frequency	120Hz ≤ f < 1kHz	1kHz ≤ f < 10kHz	10kHz ≤ f < 100kHz	100kHz ≤ f ≤ 500kHz
Coefficient	0.05	0.3	0.7	1

Catalog Deletion and EOL series

The following table is a list of our parts which have been deleted from our catalogs. If you are using any of the following models, please substitute with the suggested alternative model/series. Also, we have announced the end of life of aluminum solid capacitors with organic semiconductive electrolyte. We hope alternative parts (Aluminum Solid Capacitors with Organic Semiconductive Electrolyte) will continue to serve your needs. Thank you very much.

The list of alternatives for higher voltage

Series	Size Code	Models for Deletion	Year of Deletion	Alternative model
SVP	A5	6SVP15M	2002	10SVP15M
		4SVP22M	2002	6SVP22M
	B6	10SVP22M	2002	16SVP22M
		6SVP33M	2002	10SVP33M
	C6	6SVP56M	2002	10SVP56M
		4SVP82M	2002	6SVP82M
		4SVP100M	2002	4SVP150MX
	E7	10SVP82M	2002	16SVP82M
		6SVP120M	2002	10SVP120M
		6SVP150M	2002	10SVP150MX
		4SVP150M	2002	10SVP150MX
		4SVP220M	2002	6SVP220MX
		4SVP470M	2002	6SVP470MX
SVQP	E7	6SVQP150M	2007	10SVQP150M
		4SVQP220M	2007	6SVQP220M

The list of alternatives to 25V products

Series	Size Code	Models for Deletion	Year of Deletion	Alternative series
SVP	C6	25SVP6R8M	2013	SVPD series SVPF series
	E7	25SVP10M	2013	
	F8	25SVP22M	2013	
	E12	25SVP33M	2013	
	F12	25SVP56M	2013	
SEP	C6	25SEP6R8M	2013	SEPF series
	E7	25SEP10M	2013	
	F8	25SEP22M	2013	
	E12	25SEP33M	2013	
	F13	25SEP56M	2013	

※Surge voltage of above models is 25V and they need to apply the temperature derating voltage, so customers are encouraged to migrate to models in alternative series which is superior in operating voltage.

End of life/ Aluminum Solid Capacitors with Organic Semiconductive Electrolyte

Series	Size Code	Status
SZP	All size	EOL
SF		
SP		
SC		
SA		
SL		
SH		
SS		
SG		
SPA		
SM		
SN		
SV		

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