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SANYO

SANYO Capacitors General Catalog

2008-10

SANYO Capacitors General Catalog 2008

SANYO

Aluminum Electrolytic Capacitors

Aluminum Solid Capacitors with Conductive Polymer / Aluminum Solid Capacitors with Organic Semiconductive Electrolyte OS-CON

Aluminum Electrolytic Capacitors with Hybrid Conductive Polymer EP-cap

Tantalum Solid Capacitors with Conductive Polymer POSCAP

PRECAUTIONS

- The contents of this catalog are current as of October 2008. They may change without prior notice. When ordering products, please be sure to request a delivery specifications form and read it carefully.
- Products described herein are not intended for applications requiring extremely high reliability (for example, those in which extensive human injury or property damage may occur such as with life-support systems or aircraft control systems). For such applications, consult our sales department.
- The performance, characteristics, and features of the products described in this catalog are based on the products working alone under prescribed conditions. Data listed here is not intended as a guarantee of performance when working as part of any other product or device. In order to detect problems and situations that cannot be predicted beforehand by evaluation of supplied data, please always perform necessary performance evaluations with these devices as part of the product that they will be used in.
- When using the products listed in this catalog, please always be sure to try to prevent any possible accidents or injury by designing products in a careful and safe manner. If you have any questions concerning the use of these products, please contact any of our sales representatives.
- For any products listed in this catalog that may constitute restricted trade goods under overseas exchange or service trade laws, permission to deliver according to law may be required before importing.
- Unauthorized duplication of this catalog in part or in whole is forbidden.
- Please understand that we cannot be held responsible for any damages to the industrial properties of any third party that arise from the use or application of the products listed in this catalog, with the exception of those items directly related to method of construction.

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Please take note of the following points in order to make the best use of SANYO capacitor's performance.
Please use the capacitor within the range of specified performance after confirming each capacitor's usage environment and circuit condition.
Please choose the capacitor that matches the lifetime of the intended circuit design.
The performance of the capacitor the temperature or frequency. Therefore, please consider these variations when designing the circuit.
Please buy SANYO capacitors from our official distributors. Otherwise there is no SANYO warranty.

Line-Up

Aluminum Electrolytic Capacitor (E-CAP)
Aluminum Solid Capacitors with Conductive Polymer/Aluminum Solid Capacitors with Organic Semiconductive Electrolyte **OS-CON**
Aluminum Electrolytic Capacitors with Hybrid Conductive Polymer **EP-cap**
Tantalum Solid Capacitors with Conductive Polymer **POSCAP**

Considerations when using in industrial equipment

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

Polarity

SANYO capacitors have polarity.
Please confirm the polarity prior to use.If it is used with the polarities reverse in leakage current or a short circuit may result.
Bi-polar capacitors should be used in circuit where polarity is occasionally reversed, or where polarity is unknown.
However bi-polar capacitors cannot be used for AC circuit, too.
There is no bi-polar model of OS-CON, EP-cap and POSCAP.

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 life span.
- In case the capacitor is used under the condition out of the specified frequency, ripple current shall not exceed the value revised by the frequency coefficient.
  POSCAP About TQC series please contact us.

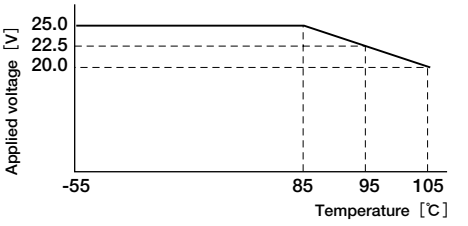
Applied voltage for designing

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 POSCAP is recommended. If the rated voltage is 10V or over, 80% and below of the rated voltage or category voltage is recommended.
- Please refer to the following table for rated voltage of OS-CON.
- 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 environmental Temperature	Applied voltage
25V products except for SVPD	85℃ below	Less than the rated voltage
	85℃ above	Applied the voltage shown right figure
All except for the above	—	Less than the rated voltage



Parallel connection

Ripple current may be flowed to the capacitor that has lower impedance when different kind of capacitors are 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.

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 pleces where condensation may form
- Places with noxious gas (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc)
- Places susceptible to ozone, ultraviolet rays and radiation
- Where vibration or shock exceeds the allowable value as specified in the catalog or specification sheet
- Places the capacitor under direct sunlight

Land pattern

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

Capacitor insulation (E-CAP. OS-CON. EP-cap)

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 in the marking sleeve and the laminate resin is not guaranteed.
- The space between the case and the negative electrode terminal is not insulated and has some resistance.

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.

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

※ Only for capacitors packed by laminate bag.

Considerations when 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 as size, material and component population of PC board. Please check the heat durability in your actual soldering condition.

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℃ to 70℃ with a resistor load of 1kΩ.
- In case the capacitor has re-striking-voltage, please apply the rated voltage to the capacitor through 1kΩ resistor.

Mounting 1

- Please mount capacitor after confirming the polarity.
- Please mount capacitor 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 capacitor or use capacitor dropped beforehand.
- Be careful not to deform the capacitor during installation.
- The space specified in the catalog or specitication sheet is needed over the pressure relieve vent of E-CAP or EP-cap.
- Avoid having the prented wire over the pressure relieve vent of E-CAP or EP-cap.
- If the space between the top of E-CAP or EP-cap and the circuit board is not enough, the hole where gas can escape is needed when the pressure relieve vent operates.

Mounting 2

- When an automatic inserter is used to clinch the capacitor lead terminal, make sure it is not set too strongly.
- Be careful to 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.
- When mounting snap-in type capacitors, please ensure it is snug fit to the circuit board.

Maintenance / Inspection

For industrial use, please periodically check the capacitor.
When checking, inspect the following points.

- Outside appearance.(Opened vent, leakage electrolyte, etc.)
- Electrical performance.(Leakage current, Capacitance, Tangent of loss angle, etc.)

Disposal of capacitors

Capacitor comprises solid organic compounds, various metals, resin, rubber, etc. Treat it as industrial waste when disposing of it.
In case of disposing a large amount of SANYO capacitor, SANYO can dispose on your behalf.

About the electronic part capacitor

Environmental concerns of SANYO capacitors

SANYO Electric Company Co.,Ltd. aims at "Environment · Energy Leading Manufacturer " under the brand vision " Think GAIA ".
Earth-conscious activities are promoted for SANYO capacitors, too.

RoHS compliance

All SANYO capacitors comply with RoHS directive (2002/95/EC).

Restricted Substance

Restricted substances of RoHS directive
Cadmium(Cd) and it's compounds
Lead(Pb) and it's compounds
Mercury(Hg) and it's compounds
Hexavalent chromium(Cr6+)
Polybrominated biphenyls(PBBs)
Polybromineted diphenyl ethers(PBDEs)

Lead-Free Stance

All complete parts and homogenous materials of SANYO capacitors are lead-free.(JEITA, PHASE3)

Halogen-Free Stance

Almost all SANYO capacitors already comply with halogen-free requirements. Please contact us for details.

The difinition of halogen-free for SANYO capacitors is about element or compound of chlorine(Cl) and bromine(Br) out of halogen family except fluorine, iodine and astatine, and satisfy the following conditions as homogeneous materials.

The content percentage of chlorine(Cl)	0.09wt% (900ppm) below
The content percentage of bromine(Br)	0.09wt% (900ppm) below
The total content percentage of chlorine(Cl) and bromine(Br)	0.15wt% (1500ppm) below

※It means a homogeneous material or the material that cannot be mechanically decomposed.

(Example)
- plastic composed of homogeneous material, adhesives, metallic material, ink, glass, paper, alloyed metal, etc.
- ink layer printed or coated on plastic material, coating layer or film of paint
- thin metallic film formed on the surface of plastic material or metallic material

OS-CON

OS-CON is an aluminum solid capacitor with high conductive polymer or organic semiconductor electrolyte material.
OS-CON acquires low Equivalent Series Resistance (ESR), excellent noise reduction capability and frequency characteristics.
In addition, OS-CON has a long life span and its ESR has little change even at low temperatures since the electrolyte is solid.

Features

Low ESR obtained by using conductive polymer electrolyte

- Suitable as a decoupling capacitor, because its impedance has ideal frequency characteristics.
- Suitable as a smoothing capacitor, enabling miniaturizing switching power supplies, because it allows large ripple current.
- Suitable as a backup capacitor for the circuits that consume large current at a high speed.

Pb-free Compliant

- All the models are completely Pb-free and RoHS compliant products.

Long life

- Some special series can be expected 50,000h life at 85℃, suitable for long-operating industrial equipments.

Superior temperature characteristics

- Its ESR has stable characteristics at a temperature from −55℃ to 105℃ (partly 125℃), suitable for applications used at low temperatures (under 0℃).

Wide capacitance range from 1 μF to 2700 μF

- An array of various series covers wide capacitance range.

High voltage, high reliability

- High reliability products have achieved the highest rated voltage 35V and the guarantee of 85℃x85%RH (SVPD series), suitable for automotive and industrial equipments.

Applications

As a smoothing, backup, and bypass capacitor used in various fields such as digital equipments, household appliances, computer-related hardware, and industrial equipments.

Series integration

① Since the following models of the SC, SA, SL, SH, SVP and SVQP series have been integrated into models with a higher voltage rating, please consider these higher voltage rating models for new adoption or model changes.

Series	Size Code	Applicable model	Alternative model
SC	A	16SC1M	25SC1M
		16SC1R5M	25SC1R5M
	B	6SC10M	10SC10M
	C	16SC10M	25SC10M
		6SC22M	10SC22M
	D	6SC47M	10SC47M
SA	C	10SA33M	16SA33M
	E	10SA100M	16SA100M
SL	B'	6SL10M	10SL10M
	C'	6SL22M	10SL22M

Series	Size Code	Applicable model	Alternative model
SL	C'	6SL33M	10SL33M
		6SL47M	10SL47M
SH	A	16SH1M	25SH1M
		16SH1R5M	25SH1R5M
	C	16SH10M	25SH10M
SVP	A5	6SVP15M	10SVP15M
		4SVP22M	6SVP22M
	B6	10SVP22M	16SVP22M
		6SVP33M	10SVP33M
	C6	6SVP56M	10SVP56M

Series	Size Code	Applicable model	Alternative model
SVP	C6	4SVP82M	6SVP82M
	E7	10SVP82M	16SVP82M
		6SVP120M	10SVP120M
		6SVP150M	10SVP150MX
		4SVP150M	10SVP150MX
		4SVP220M	6SVP220MX
	F8	4SVP470M	6SVP470MX
SVQP	E7	6SVQP150M	10SVQP150M
		4SVQP220M	6SVQP220M

② Production of the SG, SV, SM and SN series has been discontinued. Therefore, customers using these series at present are kindly requested to substitute the SP series for the SG series, and the SVP series for the SV, SM and SN series.

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⚠ Precautions for circuit designing

Crucial precautions Important

1. Prohibited circuits

(a) OS-CON leakage current may become larger as the following conditions.

(1) Soldering

(2) High temperature no-load test, high temperature and high humidity no-load test, rapidly changing temperature test, etc.

(b) Avoid the use of OS-CON in the following type of circuits because leakage current may increase.

(1) High-impedance circuits

(2) Coupling circuits

(3) Time constant circuits

(4) Other circuits that are significantly affected by leakage current

※ If you plan to use 2 or more OS-CONs in a series connection, please contact us before use.

2. Failure and life-span

The failure rate is 0.5% / 1000h (with a 60% reliability standard) based on JIS C 5003.
The mainly failure modes are as follows.

2-1. Contingency failure

The main causes of failure are thermal stresses cause by the soldering or thermal use environment, along with heat stresses, electrical stresses or mechanical stresses.
The most common failure mode is a short circuit.

(a) Phenomenon after a short circuit

(1) Organic semiconductive type (resin sealing)

- In case of a short circuit, if the pass-through current is 3A or less on ϕ 10 and 1A or less on ϕ 6.3, the OS-CON becomes heated but no effects are visible even when the current is continuously carried.
- If the short circuit currents exceed the mentioned value above.
  The temperature inside will increase and the internal press raise.
  The liquefied organic semiconductor and odorous gas are released from the space of sealant.
  In this case, keep your face and hands away from the area.

(2) Conductive polymer type (rubber sealing)

- In case of a short circuit, if the pass-through current is 1A or less on ϕ 10, 0.5A or less on ϕ 8 and 0.2A or less on ϕ 6.3, the OS-CON becomes heated,
  but no effects are visible even when the current is continuously carried.
- If the short circuit currents exceed the mentioned value above.
  The temperature inside the OS-CON will increase.
  The rubber sealing is turned over and odorous gas is released.
  In this case, keep your face and hands away from the area.

(b) In case a short circuit occurs, ensure safety by fully considering the followings.

(1) If odorous gas is released, turn off the main power of the equipment.

(2) It may take a few seconds to a few minutes before the organic semiconductor liquefies and an odorous gas produces by the situation. Increase safety by using in conjunction with a protective circuit.

(3) If the gas comes in contact with eyes, rinse immediately. If the gas is inhaled, gargle immediately.

(4) Do not lick the electrolyte. If the electrolyte comes in contact with skin, wash it off with soap immediately.

(5) OS-CON contains combustible substances. In case a large current continues to flow after a short circuit, in the worst case, the shorted-out section may ignite. For safety, install a redundant circuit or a protective circuit, etc.

2-2. Wear-out failure (life-span)

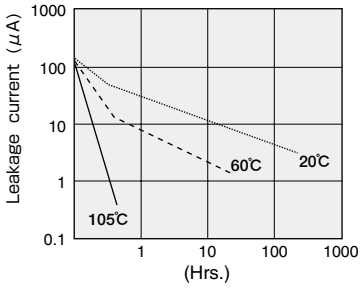
When life span exceeded the specified guarantee time of Endurance and Damp heat, electrolyte might insulate and cause electric characteristic changed. This is called an open circuit.
The electric characteristics of capacitance and ESR may possibly change within the specified range in specifications when it is used under the condition of the rated voltage,
electric and mechanical performance. Please note it when design.

Other precautions

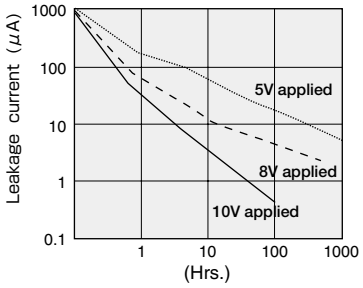
1. Leakage current

Mechanical stress may cause OS-CON leakage current increased.
In such a case, leakage current will gradually decrease by applying voltage within the category voltage and the upper category temperature.
Then, self-healing speed of leakage current is faster when it is near to the upper category temperature and the category voltage.

OS-CON
leakage current restoration characteristics
10μF/16V (16V DC applied)



OS-CON
leakage current restoration characteristics
33μF/10V (Ambient temperature:65°C)
(Measured voltage:10V)



※A sample that had stress intentionally applied to make the leakage current larger was used to make leakage current recovery easy to understand.

2. Soldering with a soldering iron

(a) Soldering condition should be under the following ranges.

	Soldering iron temperature	time
Soldering condition	400±10℃	within 5s.

※ Refer to page 5 Considerations when soldering

(b) When the lead terminal for radial lead type must be processed because the lead pitch and the PCB holes in spacing do not match, process it without any stresses to OS-CON before soldering.

(c) Solder without any excessive stresses to OS-CON itself.

(d) When an OS-CON has been soldered once and needs to be removed, remove it after the solder has been completely melted.

(e) Do not let the tip of the soldering iron touch the OS-CON itself.

3. Flow soldering

(a) Soldering condition should be under the following ranges.

Recommended flow soldering condition

	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, immersion time should be 10 + 1 sec. or less.

※ Refer to page 5 Considerations when soldering

(b) Do not apply flow soldering to SMD type.

**(c) Do not solder OS-CON itself by submerging it in melted solder.
Solder the opposite side that the OS-CON is mounted on.**

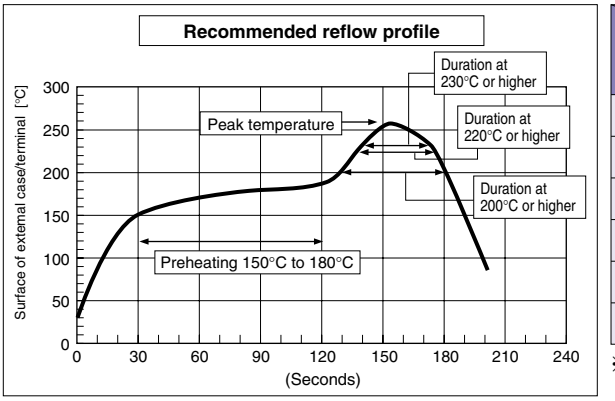
(d) Note that flux does not adhere to anywhere expect the lead terminal.

(e) Note that other components do not fall over and touch the OS-CON when soldering.

4. Reflow soldering

(a) Soldering condition should be under the following ranges.

Recommended reflow soldering condition



Item \ Series	SVP,SVQP,SVPA, SVPB,SVPC,SVPD, SVPS,SVPE Series	
Peak temperature (max)	250℃	260℃
Preheat	150℃ to 180℃ 90 ± 30 sec.	
200℃ over time (max)	60 sec.	60 sec.
220℃ over time (max)	50 sec.	50 sec.
230℃ over time (max)	40 sec.	40 sec.
Reflow number	twice or less	Only 1 time

※ All temperatures are measured on the topside of the Al-can and terminal surface.

(b) Do not apply reflow soldering to Radial Lead type.

(c) Please contact SANYO for setting VPS condition.

5. Handling after soldering

Do not subject the OS-CON to excessive stress as follows.

(a) Do not tilt, bend or twist OS-CON.

(b) Do not move the PCB with catching OS-CON itself.

(c) Do not dump the OS-CON with objects.

(d) When stacking PCBs, make sure that the OS-CON does not touch other PCBs or components.

6. 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 on Polymer conductive type and within 5 minutes on Organic semiconductive type.

(b) The temperature of the cleaning fluid should be less than 60℃.

(c) Watch the contamination of the detergent 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 maximum operating temperature.

(f) Please note that Indication may disappear when rubbing print side after washing as a cleaner.

(g) Please contact SANYO for details about detergents, cleaning methods and about detergents other than those listed above.

7. Fixatives and coating materials

(a) Select the appropriate covering and sealant materials for OS-CONs. In particular, make sure the fixative, coating and thinner do not contain acetone.

(b) Before applying a fixative or coating, completely remove any flux residue and foreign matter from the area where the board and OS-CON will be jointed together.

(c) Allow any detergent to dry before applying the fixative or coating.

(d) Please contact SANYO for fixative and coating heat curing conditions.

8. Storage conditions

Open the bags just befor mouting and use up all products once opend, For keeping a good solderability, store the OS-CON as follows.

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

※1 The JEDEC J-STD-020 Rev.C Standard is not applicable.

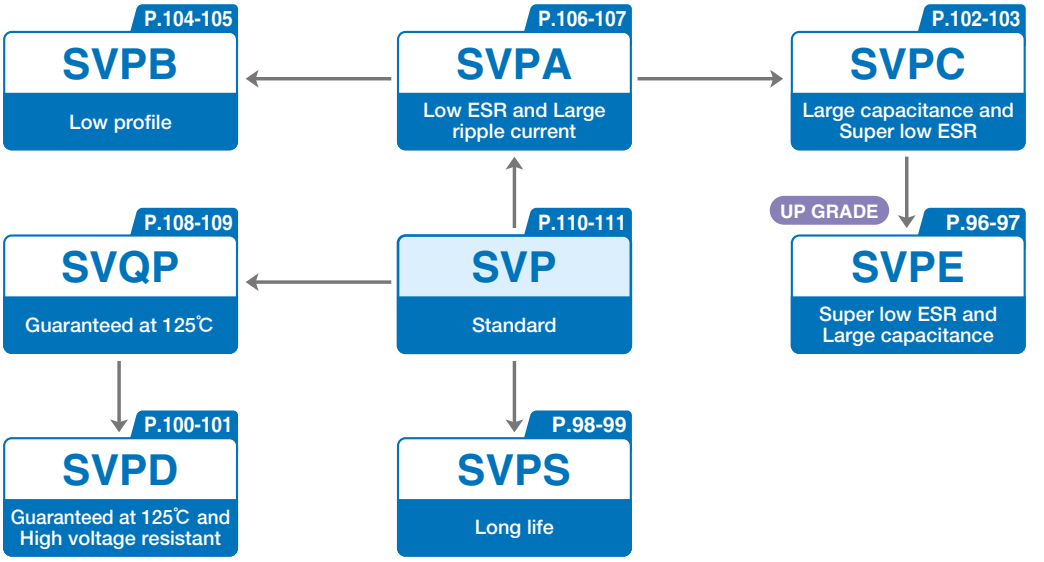
※ Please contact SANYO for Organic Semiconductor type.

Product Line-up Table

Classification		Series	Page	Features	Large capacitance	Low ESR	High voltage	Long life	Category Temperature Range (℃)	Rated Voltage Range (V.DC)	Capacitance Range (μF)	External Appearance	Marking Color
Conductive polymer electrolyte	SMD type 	UP GRADE SVPE	96 to 97	Super low ESR, large capacitance	●	●			−55 to +105	2.5 to 6.3	220 to 390	–	Purple
		SVPS	98 to 99	Long life				●	−55 to +105	4.0 to 25	10 to 680	–	Purple
		SVPD	100 to 101	Guaranteed at 125℃, rated 35V max.			●		−55 to +125	10 to 35	8.2 to 82	–	Purple
		SVPC	102 to 103	Large capacitance, super low ESR	●	●			−55 to +105	2.5 to 16	39 to 2700	–	Purple
		SVPB	104 to 105	Low profile					−55 to +105	2.5 to 20	15 to 120	–	Purple
		SVPA	106 to 107	Low ESR, large ripple current		●			−55 to +105	2.5 to 20	10 to 820	–	Purple
		SVQP	108 to 109	Guaranteed at 125℃					−55 to +125	4.0 to 20	22 to 220	–	Purple
		SVP	110 to 111	Standard					−55 to +105	2.5 to 25	3.3 to 1500	–	Purple
	Radial lead type 	UP GRADE SEPC	112 to 113	Super low ESR, large capacitance, miniaturization and low profile	●	●			−55 to +105	2.5 to 16	100 to 2700	–	Purple
		SEQP	114 to 115	Guaranteed at 125℃, high voltage			●		−55 to +125	4.0 to 32	6.8 to 1200	–	Purple
		SEP	116 to 117	Guaranteed for 3,000h				●	−55 to +105	2.5 to 25	6.8 to 1500	–	Purple
Organic semiconductor electrolyte	Radial lead type 	SF	118 to 119	5mm height max.					−55 to +105	4.0 to 6.3	150 to 220	Purple	White
		SP	120 to 121	Large capacitance & low ESR for audio	●	●			−55 to +105	2.0 to 25	6.8 to 2200	Purple	White
		SC	122 to 123	Standard					−55 to +105	6.3 to 30	1.0 to 47	Purple	White
		SA	124 to 125	Large capacitance, miniaturization	●				−55 to +105	6.3 to 20	15 to 2200	Purple	White
		SL	126 to 127	Low profile					−55 to +105	4.0 to 25	1.0 to 220	Purple	White
		SH	128 to 129	Long life				●	−55 to +105	6.3 to 25	1.0 to 330	Purple	White
		SS	130 to 131	Miniaturization					−55 to +105	4.0 to 20	2.2 to 470	Purple	White

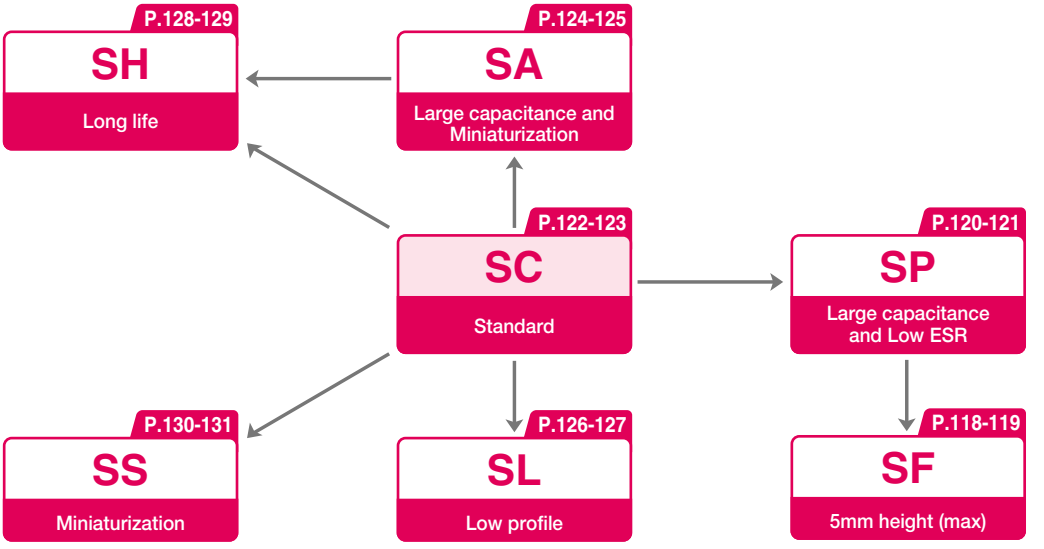
1. System Diagram

SMD type Aluminum solid capacitors with Conductive polymer



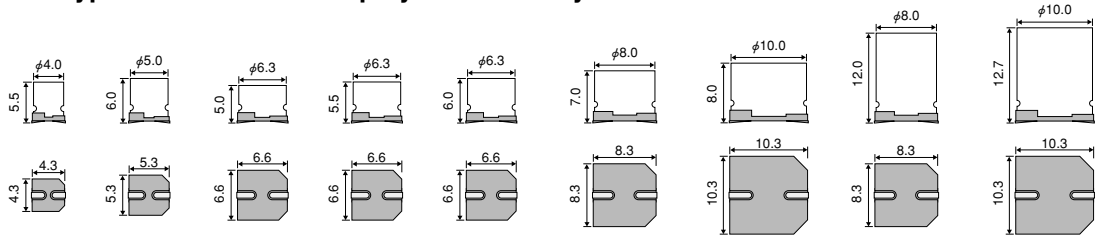
Radial lead type Aluminum solid capacitors with Conductive polymer

Radial lead type Aluminum solid capacitors with Organic semiconductive electrolyte



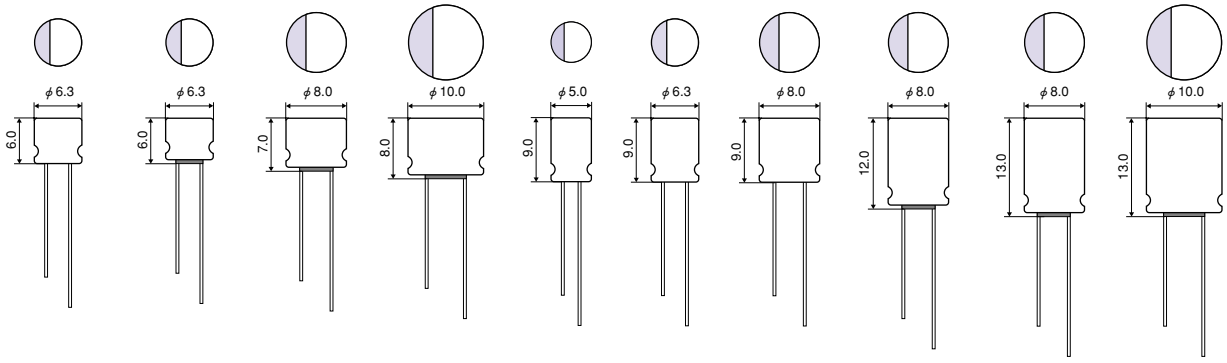
Sketch of Case Size (unit:mm)

SMD type with conductive polymer electrolyte



A5 B6 C5 C55 C6 E7 F8 E12 F12 (Size code)

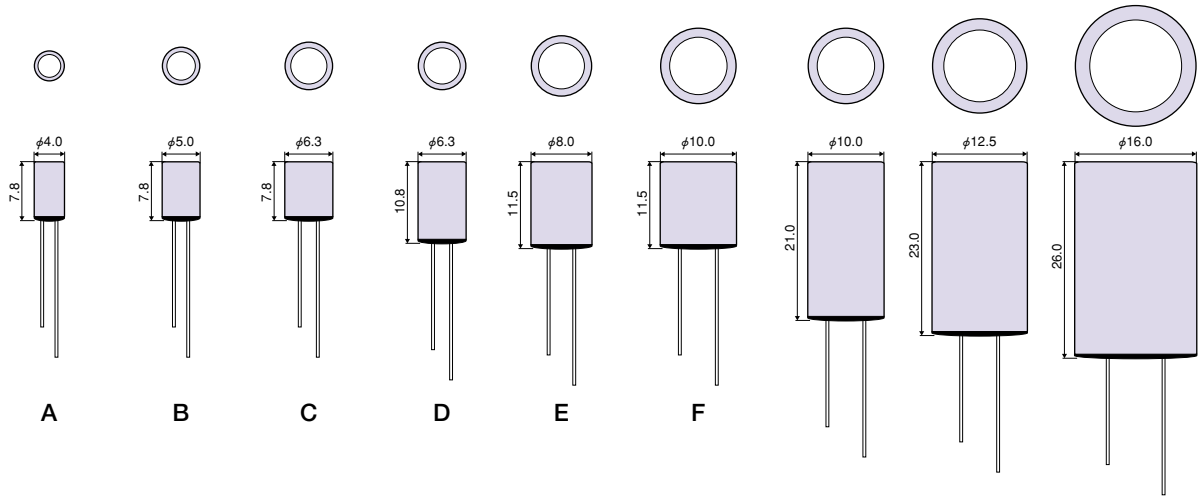
Radial lead type with conductive polymer electrolyte



C6 (SEPC) C6 E7 F8 B9 C9 E9 E12 E13 F13

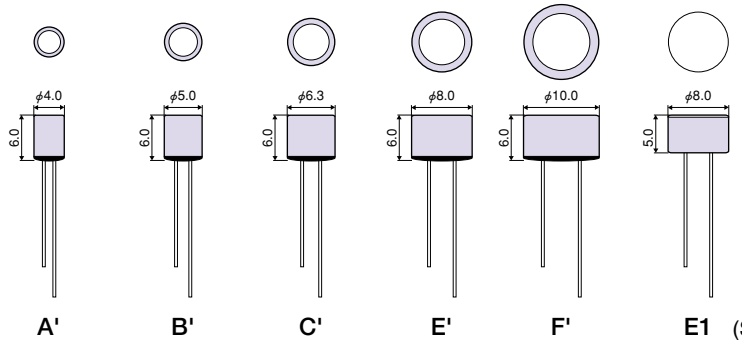
(Size code)

Radial lead type with Organic semiconductive electrolyte



A B C D E F F_0 G H

(Size code)



A' B' C' E' F' E1 (Size code)

※ Profile of case size are all expressed in maximum values.
※ Unit:mm

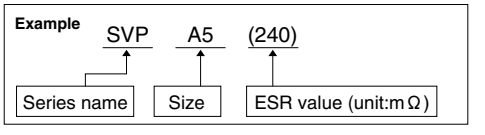
Size·ESR Matrix List SMD Type

μF \ V	2.5	4.0		6.3		10	
3.3							
4.7						SVP A5(240)	
6.8						SVP A5(240)	
8.2							
10						SVPS A5(220) SVP A5(220)	
15						SVPS A5(200)	SVP A5(200)
18							
22				SVPS A5(200) SVP A5(200)			
27							
33		SVPS A5(200)	SVP A5(200)			SVPS B6(70)	SVP B6(70)
39		SVP B6(70)					
47				SVPS B6(30) SVPA B6(30)	SVP B6(70)	SVP C6(50)	
56						SVPD C6(45) SVPB C5(40)	SVQP C6(45) SVP C6(45)
68		SVPS B6(30) SVPA B6(30)	SVP B6(60)			SVPS C6(30) SVPC B6(30)	SVPC B6(23) SVPA C6(30)
82	SVPA B6(30)			SVPB C5(40) SVQP C6(45) SVP C6(45)			
100		SVPB C5(40)		SVPC B6(30) SVPC B6(25)	SVQP C6(40) SVP C6(40)		
120	SVPB C5(40)			SVPS C6(22) SVPC B6(21)	SVPA C6(22) SVP C6(17)	SVPC C6(27) SVPC C6(22)	SVQP E7(35) SVP E7(35)
150		SVPS C6(22) SVPC B6(30) SVPC B6(23) SVPC B6(20)	SVPA C6(22) SVQP C6(40) SVP C6(40)			SVPS E7(30) SVPS F8(30) SVPA E7(30) SVQP E7(35)	SVP E7(35) SVP F8(30)
180	SVPC B6(30) SVPC B6(24) SVPC B6(19) SVPA C6(20)						
220	SVP C6(23)			SVPE C6(10) SVPS E7(22) SVPC C6(27) SVPC C6(15)	SVPA E7(22) SVQP E7(35) SVP E7(35) SVP F8(25)		
270		SVPS E7(22)	SVPA E7(22)			SVPC E7(22)	SVP F8(25)
330	SVPA E7(20)	SVPC C6(27) SVPC C6(21)	SVPC C6(15) SVP E7(35)	SVPC C6(17) SVP F8(25)		SVPS F8(24) SVPA F8(24)	SVP F8(25) SVP E12(17)
390	SVPE C6(10) SVPC C6(25) SVPC C6(15)			SVPC E7(22)			
470				SVPS F8(20) SVPA F8(20)	SVP F8(25) SVP E12(15)		
560	SVPC C6(16)	SVPC E7(22) SVPC E12(9)	SVP E12(13)			SVP F12(13)	
680	SVPC E7(20) SVP E12(13)	SVPS F8(20) SVPA F8(20)	SVP F8(25)				
820	SVPC E12(9) SVPA F8(19)			SVPC E12(12) SVP F12(12)			
1200		SVPC E12(12)	SVP F12(12)				
1500	SVPC E12(10) SVP F12(12)	SVPC E12(12)					
2700	SVPC F12(12)						

●···**Conductive polymer type**

How to read the lists in P88-91

- The name, sizes and ESR values of each series are found where the voltage (V) and capacitance (μF) intersect each other. (Refer to the example.)
- Please confirm the details in the list of each series from P96 to P131.
- When you find two or more series names in one section, they have different part numbers. Please confirm the number in the Series Characteristics List of each series.



Size·ESR Matrix List SMD Type

16		20		25	35	V / μF
SVP A5(260)						3.3
						4.7
				SVP C6(80)		6.8
					SVPD E7(70)	8.2
		SVPA B6(40) SVP B6(120)		SVPS E7(60) SVPD C6(65) SVP E7(60)		10
SVP B6(120)		SVPB C5(45)				15
					SVPD F8(60)	18
SVPS B6(90) SVP B6(90)		SVPS C6(60) SVPB C55(35) SVPA C6(35)	SVQP C6(60) SVP C6(60)	SVPD E7(48) SVP F8(50)	SVPD E12(50)	22
		SVP C6(60)				27
SVPB C5(40)		SVP E7(45)		SVP E12(30)		33
SVPS C6(24) SVPC B6(35) SVPC B6(27) SVPA C6(35)	SVPA C6(24) SVQP C6(50) SVP C6(50)			SVPD F8(45)		39
		SVPS E7(45) SVPA E7(33)	SVQP E7(45) SVP E7(45)	SVPD E12(30)	SVPD F12(30)	47
SVP E7(45)		SVP F8(40)		SVP F12(28)		56
SVPC C6(30) SVPC C6(25)		SVP F8(40)				68
SVPS E7(30) SVPD E7(40) SVPA E7(30)	SVQP E7(40) SVP E7(40)			SVPD F12(28)		82
SVPS F8(35) SVPC C6(24)	SVP F8(35)	SVP E12(24)				100
SVPC E7(27)						120
SVPC E7(22) SVP F8(30)		SVP F12(20)				150
SVPS F8(29) SVPA F8(29) SVP F8(30)	SVP E12(20)					180
						220
SVPC E12(16)						270
SVP F12(16)						330
						390
						470
						560
						680
						820
						1200
						1500
						2700

●···**Conductive polymer type**

Standard sizes (Conductive polymer type) (unit : mm)

A5	φ4.0×L5.5	E7	φ8.0×L7.0
B6	φ5.0×L6.0	F8	φ10.0×L8.0
C5	φ6.3×L5.0	E12	φ8.0×L12.0
C55	φ6.3×L5.5	F12	φ10.0×L12.7
C6	φ6.3×L6.0		

Size·ESR Matrix List Radial Lead Type

V / μF	2.0	2.5	4.0		6.3		10	
1								
1.5								
2.2								
3.3								
4.7							SC A(280) SL A'(400)	SH A(280)
6.8					SC A(250) SL A'(350) SH A(250)			
10							SC B(150) SL B'(150) SH B(150)	SS A'(350)
15					SC B(120) SL B'(120)	SH B(120) SS A'(350)		
18								
22							SC C(70) SL C'(80) SS B'(150)	
33					SC C(70) SS B'(150)		SL C'(80)	
39								
47					SA C(60) SH C(60)		SC D(60) SL C'(70)	
56							SEQP C6(45) SEP C6(45)	SP C'(45)
68			SS C'(70)		SP C'(40)		SA D(50) SL E'(65) SH D(50)	
82					SEQP C6(45)	SEP C6(45)	SP C(40)	
100		SEPC B9(7)	SEP C6(40) SP C'(40)		SL E'(65)		SP E'(32) SL F'(60) SS D(40)	
120					SP C(35)		SEQP E7(35)	SEP E7(35)
150			SEQP C6(40) SEP C6(40) SP C(35) SL E'(60)	SS D(40)	SEQP E7(35) SEP E7(35) SF E1(32) SP E'(30)	SA E(30) SL F'(60) SH E(30)	SP D(25) SS E(30)	
180							SP F'(29)	
220			SEP E7(35) SF E1(30)	SP E'(28) SL F'(55)	SP F'(28) SP D(20)	SS E(30)	SA F(27) SH F(27)	
270			SP D(20)				SEQP F8(25) SEP F8(25)	SP E(18)
330		SEPC B9(7) SEPC C9(7)	SEQP E7(35) SEP E7(35)	SP F'(24)	SEQP F8(25) SEP F8(25)	SA F(25) SH F(25)	SEQP E12(17) SEP E12(17)	SS F(25)
390		SEPC C6(10)			SP E(16)			
470		SEPC B9(7)	SEP F8(25) SS F(25)		SEPC C9(7) SEPC E9(8) SEPC E13(8)	SEQP E12(15) SEP E12(15)	SP F(15)	
560		SEPC B9(7) SEPC C9(7) SEPC E9(8)	SEPC C9(7) SEPC E9(7) SEPC E13(7)	SEQP E12(13) SEP E12(13) SP E(14)	SEPC C9(8) SEPC E9(7)		SEQP F13(13) SEP F13(13)	
680		SEP E12(13)	SEPC E13(7) SEQP F8(25)	SEP F8(25)	SEPC F13(7) SP F(13)			
820		SEPC C9(7) SEPC E9(5) SEPC E9(7) SEPC E13(7)	SEPC F13(7) SP F(12)		SEQP F13(12) SEP F13(12)			
1000	SP F(11)	SEPC E9(7)	SP F(12)					
1200		SP F(12)	SEQP F13(12)	SEP F13(12)				
1500		SEP F13(12)	SP Fo(8)		SEPC F13(10)			
1800	SP Fo(8)							
2200			SP G(9)		SA H(15)			
2700		SEPC F13(10)						

●···Conductive polymer type ●···Organic semiconductive Electrolyte type

Standard sizes (Conductive polymer type) (unit : mm)

C6	φ6.3×L6.0	E7	φ8.0×L7.0	E12	φ8.0×L12.0
B9	φ5.0×L9.0	F8	φ10.0×L8.0	E13	φ8.0×L13.0
C9	φ6.3×L9.0	E9	φ8.0×L9.0	F13	φ10.0×L13.0

Size·ESR Matrix List Radial Lead Type

16		20		25		30	32	V / μF
				SC A(350) SL A'(450)	SH A(350)	SC A(350)		1
				SC A(300) SL A'(400)	SH A(300)	SC B(300)		1.5
SC A(280) SL A'(400)	SH A(280)	SS A'(400)		SC B(200) SL B'(250)	SH B(200)	SC B(250)		2.2
SC A(280) SL A'(400)	SH A(280)	SS A'(400)		SC B(200) SL B'(250)	SH B(200)	SC C(200)		3.3
SC B(180) SL B'(250)	SH B(180) SS A'(400)	SS B'(250)		SC C(100) SL C'(100)	SH C(100)	SC D(120)		4.7
SL B'(180) SH B(150) SS A'(400)		SS B'(180)		SEP C6(80) SP C'(60) SC C(100)	SL C'(100) SH C(100)	SC D(120)	SEQP E7(100)	6.8
SL C'(100) SS B'(150)		SS C'(100)		SEP E7(60) SP C(55) SC C(90)	SH C(90)	SC E(110)		10
SC C(90) SL C'(100)	SS B'(150)	SA C(90) SH C(90)	SS C'(100)	SC D(70) SL E'(75)	SH D(70)		SEQP F8(80)	15
				SP D(40)			SEQP E12(50)	18
SC D(70)		SEQP C6(60) SEP C6(60) SP C'(50)	SA C(70) SH C(70) SS C'(100)	SEP F8(50) SC E(40) SL F'(70)		SC F(80)		22
SC D(70) SP C'(50) SA C(70)	SH C(70) SS C'(100)	SEP E7(45) SP C(45) SA D(70)	SH D(70)	SEP E12(30) SP E(30) SC F(35)				33
SEQP C6(50)	SEP C6(50)							39
SP C(45) SA D(60) SL E'(70)	SH D(60)	SEQP E7(45) SEP E7(45) SP E'(36)	SA E(40) SH E(40) SS D(60)	SC F(35)				47
		SEP F8(40)		SEP F13(28) SP F(25)				56
SP E'(34) SL F'(65) SS D(50)		SEQP F8(40) SEP F8(40) SP F'(34)	SP D(30) SA E(36) SH E(36)					68
SEQP E7(40)	SEP E7(40)							82
SEPC C6(24) SEPC C9(10) SP F'(32)	SP D(25) SA E(30) SH E(30)	SEQP E12(24) SEP F8(35) SEP E12(24)	SA F(30) SH F(30) SS E(30)					100
		SP E(24)						120
SEQP F8(30) SEP F8(30) SA F(28) SH F(28)		SEQP F13(20) SEP F13(20) SS F(30)						150
SEQP E12(20) SEPC E9(10)	SEPC E12(16) SEP E12(20) SP E(20)	SP F(20)						180
								220
SEPC E12(11) SP F(18)								270
SEQP F13(16) SEP F13(16)								330
								390
SEPC F13(10) SA G(20)								470
								560
								680
								820
SA H(15)								1000
								1200
								1500
								1800
								2200
								2700

●···Conductive polymer type ●···Organic semiconductive Electrolyte type

Standard sizes (Organic semiconductive Electrolyte type) (unit : mm)

A	φ4.0XL7.8	D	φ6.3XL10.8	F0	φ10.0XL21.0	A'	φ4.0XL6.0	E'	φ8.0XL6.0
B	φ5.0XL7.8	E	φ8.0XL11.5	G	φ12.5XL23.0	B'	φ5.0XL6.0	F'	φ10.0XL6.0
C	φ6.3XL7.8	F	φ10.0XL11.5	H	φ16.0XL26.0	C'	φ6.3XL6.0	E1	φ8.0XL10.0

Specifications for SMD type

1. Part number system

1	6	S	V	P	3	R	3	M

Rated voltage

Rated volt.	Code
2.5	2R5
4.0	4
6.3	6
10	10
16	16
20	20
25	25
35	35

Series name

SVP Series
SVQP Series
SVPA Series
SVPB Series
SVPC Series
SVPD Series
SVPS Series
SVPE Series

Rated capacitance

Example

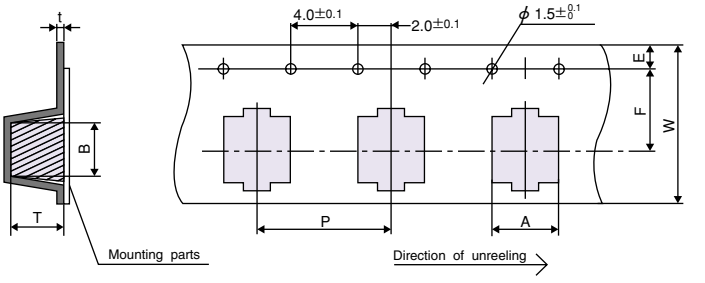
Rated Cap.(μF)	Code
3.3	3R3
4.7	4R7
10	10
22	22
100	100
220	220
470	470
1500	1500

Capacitance tolerance

Cap. tolerance	Code
±20%	M

2. Taping

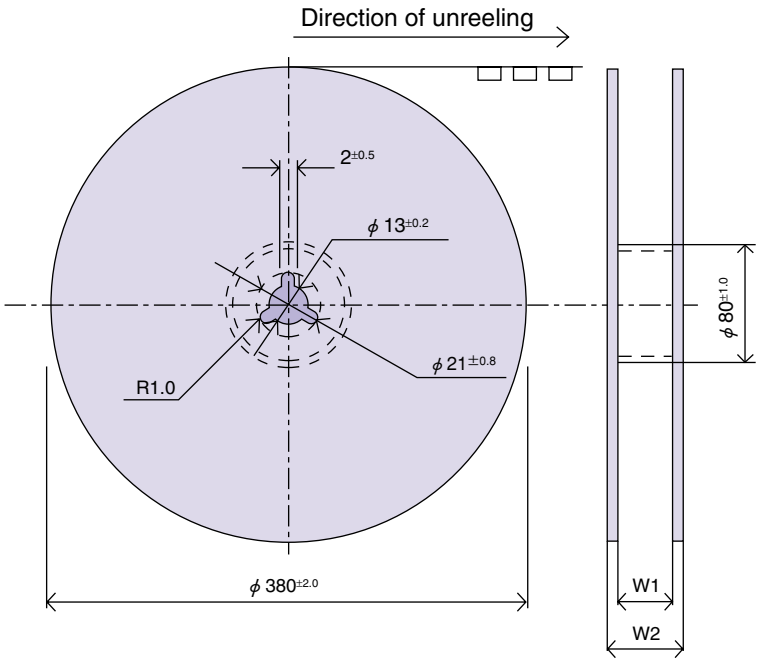
2-1. Carrier tape



(unit : mm)

Dimension / Size code	A	B	W	F	E	P	t	T
A5	4.7 ±0.2	4.7 ±0.2	12.0 ±0.3	5.5 ±0.1	1.75 ±0.1	8.0 ±0.1	0.4 ±0.1	5.8 ±0.2
B6	5.6 ±0.2	5.6 ±0.2	16.0 ±0.3	7.5 ±0.1	1.75 ±0.1	8.0 ±0.1	0.4 ±0.1	6.2 ±0.2
C5	6.9 ±0.2	6.9 ±0.2	16.0 ±0.3	7.5 ±0.1	1.75 ±0.1	12.0 ±0.1	0.4 ±0.1	5.3 ±0.2
C55	6.9 ±0.2	6.9 ±0.2	16.0 ±0.3	7.5 ±0.1	1.75 ±0.1	12.0 ±0.1	0.4 ±0.1	6.2 ±0.2
C6	6.9 ±0.2	6.9 ±0.2	16.0 ±0.3	7.5 ±0.1	1.75 ±0.1	12.0 ±0.1	0.4 ±0.1	6.2 ±0.2
E7	8.6 ±0.2	8.6 ±0.2	24.0 ±0.3	11.5 ±0.1	1.75 ±0.1	12.0 ±0.1	0.4 ±0.1	7.2 ±0.2
F8	10.7 ±0.2	10.7 ±0.2	24.0 ±0.3	11.5 ±0.1	1.75 ±0.1	16.0 ±0.1	0.4 ±0.1	8.2 ±0.2
E12	8.6 ±0.2	8.6 ±0.2	24.0 ±0.3	11.5 ±0.1	1.75 ±0.1	16.0 ±0.1	0.5 ±0.1	12.3 ±0.2
F12	10.7 ±0.2	10.7 ±0.2	24.0 ±0.3	11.5 ±0.1	1.75 ±0.1	16.0 ±0.1	0.4 ±0.1	13.0 ±0.2

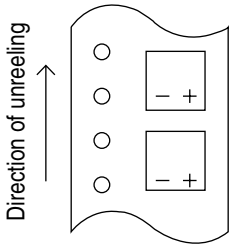
2-2. Reel



(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
E7, F8, E12, F12	25.0±0.5	29.5±1.0

2-3. Polarity



3. Minimum Packing Quantity

Taping type

Size Code	pcs./Reel (φ380)
A5	2000
B6	1500
C5	1300
C55	1000
C6	1000
E7	1000
F8	500
E12	400
F12	400

Specifications for radial lead type

1. Part number system

1	6	S	L	4	R	7	M	+	T	S

Rated voltage

Rated volt.	Code
2.0	2
2.5	2R5 ※1
4.0	4
6.3	6
10	10
16	16
20	20
25	25
30	30
32	32

Series name

SC Series
SA Series
SL Series
SH Series
SP Series
SS Series
SEP Series
SEQP Series
SEPC Series
SF Series

Rated capacitance

Example

Rated Cap.(μF)	Code
1	1
2.2	2R2
4.7	4R7
10	10
22	22
100	100
220	220
1000	1000
2700	2700

Capacitance tolerance

Cap. tolerance	Code
±20%	M

Taping or forming of terminal code

Taping or lead terminal wire process code
None suffix for regular length lead type products

※1 Code 2 is used for 2.5V products of B9,C6,C9,E9 and F13 size in SEPC series.

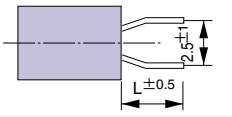
2. Lead terminal process

2-1. Applications

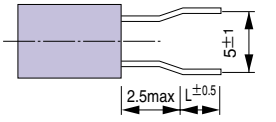
※ The following table is a standard specification. Please contact us concerning other specifications and +S taping.

Series		Size code	Bag-packed products (lead terminal cutting)			Taping
			Not processed	Forming cut	Straight cut	
Conductive polymer	SEP,SEQP	C6,E7,E12	○	×	+C3	+TSS
		F8,F13	○	×	+C3	+T
	SEPC	C6,C9,E9,E12	○	×	+C3	+TSS(+S)
		E13	○	×	+C3	+TS
		F13	○	×	+C3	+T
Organic semiconductor	SF	E1	○	×	×	+T,+TS
	SP	C',E',C,D,E	○	×	×	+T,+TS
		F',F	○	×	×	+T
		F0,G	○	×	×	×
	SC,SH	A,B	○	+CA,+CC,+CD,+F,+F1,+F2	+C3	+T,+TS
		C,D,E	○	+F,+F1,+F2	+C3	+T,+TS
		F	○	×	+C3	+T
	SA	C,D,E	○	+F,+F1,+F2	+C3	+T,+TS
		F	○	×	+C3	+T
		G,H	○	×	×	×
	SL	A'	○	+CA,+CC,+CD,+F,+F1,+F2	×	+T,+TS
		B'	○	+CA,+CC,+CD,+F,+F1,+F2	+C3	+T,+TS
		C',E'	○	+F,+F1,+F2	+C3	+T,+TS
		F'	○	×	+C3	+T
	SS	A'	○	+CA,+CC,+CD,+F,+F1,+F2	×	+T,+TS
		B'	○	+CA,+CC,+CD,+F,+F1,+F2	+C3	+T,+TS
		C',D,E	○	+F,+F1,+F2	+C3	+T,+TS
		F	○	×	+C3	+T

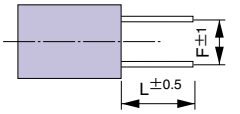
2-2. Lead terminal cutting

Lead terminal cutting code	Process names	Size code (φD)	Dimensions (unit : mm)
+CA +CC +CD	Lead space : 2.5mm forming cut	A, A' (φ4) B, B' (φ5)	

	CA	CC	CD
L	5.5	4.0	2.5

+F +F1 +F2	Lead space : 5mm forming cut	A, A' (φ4) B, B' (φ5) C, C', D (φ6.3) E, E' (φ8)	

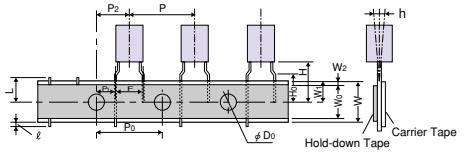
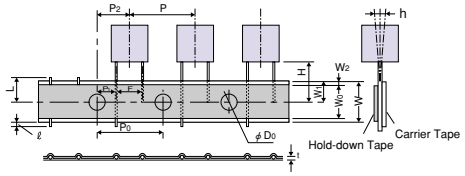
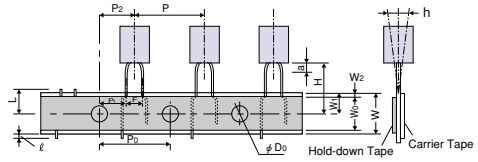
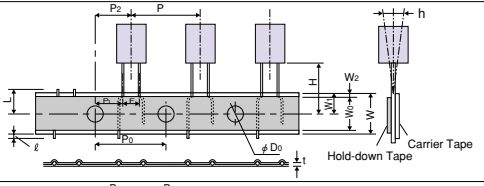
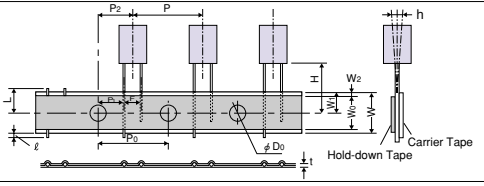
	F	F1	F2
L	5.5	4.5	3.0

+C3	Straight cut	A (φ4) B, B' (φ5) C, C', C6, C9, D (φ6.3) E, E', E7, E9, E12, E13 (φ8) F, F', F8, F13 (φ10)	

	C3
L	3.5

Size Code	A	B, B'	C,C',C6,C9,D	E,E',E7,E9,E12,E13	F, F', F8, F13
F	2.0	2.0	2.5	3.5	5.0

2-3. Lead terminal Taping

Taping code	F	Size code (φD)	Taping
+T	F=5.0mm	A,A' (φ4) B,B' (φ5) C,C',D (φ6.3) E,E' (φ8)	
		F,F',F8,F13 (φ10)	
+TS	F=2.5mm F=3.5mm	A,A' (φ4) B,B' (φ5)	
		C,C',D (φ6.3) E,E',E1,E13 (φ8)	
+TSS (+S)	F=2.5mm F=3.5mm	C6,C9 (φ6.3) E7,E9,E12 (φ8)	

(unit : mm)

Code		F	P	P0	P1	P2	△h	W	W0	W1	W2	H	H0	φD0	t	ℓ	L	a
Tolerance		+0.8 −0.2	±1.0	±0.2	±0.5	±1.0	±1.0	±0.5	min.	±0.5	max	±0.75	±0.5	±0.2	±0.3	max	max	max
+T	φ4	5.0	12.7	12.7	3.85	6.35	0	18.0	9.5	9.0	2.5	18.5	16.0	4.0	0.6	0	11.0	-
	φ5	5.0	12.7	12.7	3.85	6.35	0	18.0	9.5	9.0	2.5	18.5	16.0	4.0	0.6	0	11.0	-
	φ6.3	5.0	12.7	12.7	3.85	6.35	0	18.0	9.5	9.0	2.5	18.5	16.0	4.0	0.6	0	11.0	-
	φ8	5.0	12.7	12.7	3.85	6.35	0	18.0	9.5	9.0	2.5	20.0	16.0	4.0	0.6	0	11.0	-
	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	φ4	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	1.5
	φ5	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	1.5
	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	-
+TSS (+S)	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

Packing quantities standard • Processed type discrete lead terminals

Size Code	Case Size	pcs./Bag
A,A'	φ 4	500
B,B',B9	φ 5	500
C,C',C6,C9,D	φ 6.3	500
E,E',E7,E9,E12,E13,E1	φ 8	200
F,F',F8,F13	φ 10	200
F0	φ 10	100
G	φ 12.5	50
H	φ 16	25

Zig-zag pack taping type

Size Code	Case Size	pcs./Box
A,A'	φ 4	2000
B,B',B9	φ 5	2000
C,C',C6,C9,D	φ 6.3	1500
E,E',E7,E9,E12,E13,E1	φ 8	1000
F,F',F8,F13	φ 10	500

※ Ordering information
φ10(F0), φ12.5 and φ16 are packing type only.

OS-CON SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

SVPE Series

Super low ESR

Large capacitance

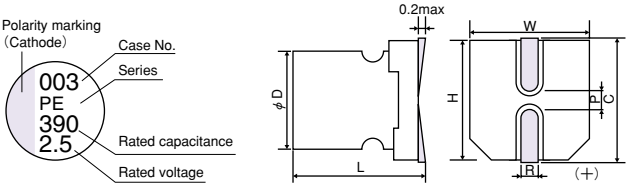
The SVPE series capacitor has lower ESR than SVPC series.
Adopt this series to reduce the size of equipment and circuits. This product can support lead free-reflow.※2

■ Specifications

Items	Condition		Specifications	
Rated voltage (V)	—		2.5	6.3
Surge voltage (V)	Room temperature		3.3	8.2
Category temperature range (℃)	—		−55 to +105	
Capacitance tolerance (%)	120Hz/20℃		M : ±20	
Dissipation Factor (DF)	120Hz/20℃		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℃		Please see the attached characteristics list	
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz, +20℃	−55℃ Z/Z20℃	0.75 to 1.25	
		+105℃ Z/Z20℃	0.75 to 1.25	
Endurance	105℃,2,000h, Rated voltage applied	△C/C	Within ±20%	
		tan δ	1.5 times or less than an initial standard	
		ESR	1.5 times or less than an initial standard	
		LC	Below an initial standard	
Damp heat(Steady state)	60℃,90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20%	
		tan δ	1.5 times or less than an initial standard	
		ESR	1.5 times or less than an initial standard	
		LC	Below an initial standard (after voltage processing)	
Resistance to soldering heat※2	VPS (230°C X 75s)	△C/C	Within ±10%(±15% for 2.5V)	
		tan δ	1.3 times or less than an initial standard	
		ESR	1.3 times or less than an initial standard	
		LC	Below an initial standard (after voltage processing)	

※1 When measured values are questionable, measure after voltage processing mentioned below.
Voltage processing: Apply voltage for 120 minutes at 105°C.
※2 Please refer to page 84 for reflow soldering conditions.

■ Marking and dimensions



(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
C6	6.3	5.9	6.6	6.6	7.3	0.6 to 0.8	2.1

■ Size List

RV : Rated voltage

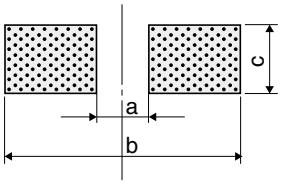
μF \ RV	2.5	6.3
220		C6
390	C6	

■ SVPE Series Characteristics List

Size Code	Part Number	Rated voltage (V)	Rated capacitance (μF)	ESR (mΩ) (max)		Rated ripple current 100kHz (mArms) at 105°C	Tangent of loss angle (% max)	Leakage current (μA)(max) After 2 minutes
				100kHz/20°C	300kHz/20°C※1			
C6	2R5SVPE390M	2.5	390	10	9	3900	12	500
	6SVPE220M	6.3	220	10	9	3900	12	500

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

■ Recommended land pattern dimension of PWB



(unit : mm)

Size Code	a	b	c
C6	2.1	9.1	1.6

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 SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

SVPS Series

Long Life

The SVPS series has longer lifespan than the SVP series. They are a good choice to extend the life of flat panel television sets and others. Lead free-reflow is supported.※2

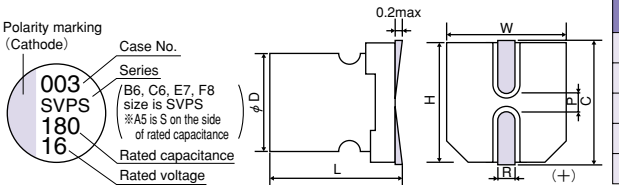
Specifications

Items	Condition		Specifications					
Rated voltage (V)	—		4.0	6.3	10	16	20	25
Surge voltage (V)	Room temperature		5.2	8.2	12	18.4	23	25
Category temperature range (℃)	—		−55 to +105					
Capacitance tolerance (%)	120Hz/20℃		M : ±20					
Dissipation Factor (DF)	120Hz/20℃		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℃		Please see the attached characteristics list					
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz, +20℃	−55℃ Z/Z20℃	0.75 to 1.25					
		+105℃ Z/Z20℃	0.75 to 1.25					
Endurance	105℃, 5,000h, Rated voltage applied (25V → 20V applied)	△C/C	Within ±20%					
		tan δ	1.5 times or less than an initial standard					
		ESR	1.5 times or less than an initial standard					
		LC	Below an initial standard					
Damp heat(Steady state)	60°C, 90 to 95% RH, 1,000h, No-applied voltage	△C/C	Within ±20%					
		tan δ	1.5 times or less than an initial standard					
		ESR	1.5 times or less than an initial standard					
		LC	Below an initial standard (after voltage processing)					
Resistance to soldering heat※2	VPS (230°C X 75s)	△C/C	Within ±10%					
		tan δ	1.3 times or less than an initial standard					
		ESR	1.3 times or less than an initial standard					
		LC	Below an initial standard (after voltage processing)					

※1 When measured values are questionable, measure after voltage processing mentioned below.
Voltage processing: Apply voltage for 120 minutes at 105°C. The voltage to be applied is the rated voltage for 4.0-20V products, and 20V for 25V products.
※2 Please refer to page 84 for reflow soldering conditions.

Marking and dimensions

(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
A5	4.0	5.4	4.3	4.3	5.0	0.6 to 0.8	1.0
B6	5.0	5.9	5.3	5.3	6.0	0.6 to 0.8	1.4
C6	6.3	5.9	6.6	6.6	7.3	0.6 to 0.8	2.1
E7	8.0	6.9	8.3	8.3	9.0	0.6 to 0.8	3.2
F8	10.0	7.9	10.3	10.3	11.0	0.6 to 0.8	4.6

Size List

RV : Rated voltage

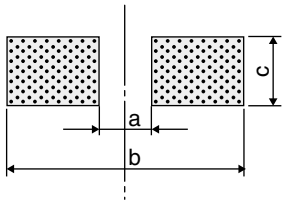
μF \ RV	4.0	6.3	10	16	20	25
10			A5			E7
15			A5			
22		A5		B6	C6	
33	A5		B6			
39				C6		
47		B6			E7	
68	B6		C6			
82				E7		
100				F8		
120		C6				
150	C6		E7、F8			
180				F8		
220		E7				
270	E7					
330			F8			
470		F8				
680	F8					

■ 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(mArms)※1	Tangent of loss angle (% 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

OS-CON SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

SVPD Series

Guaranteed at 125℃ | Rated 35V max.

85℃×85% guaranteed,Rated 35V

The SVQP series guaranteed 125℃ high voltage resistance was improved to a rated maximum of 35V.This product is very reliable, guaranteeing 85℃×85% performance. Suitable for use in smoothing circuits of vehicle-mounted equipment, industrial equipment, etc. This product can support lead free-reflow. ※2

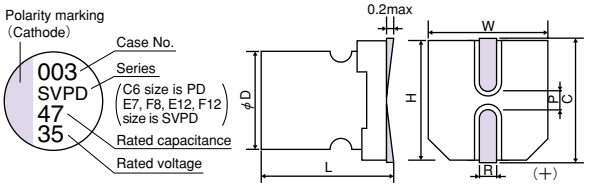
Specifications

Items	Condition		Specifications			
Rated voltage (V)	—		10	16	25	35
Surge voltage (V)	125℃		12	18.4	29	40
Category temperature range (℃)	—		−55 to +125			
Capacitance tolerance (%)	120Hz/20℃		M : ±20			
Dissipation Factor (DF)	120Hz/20℃		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℃		Please see the attached characteristics list			
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz. +20℃	−55℃ Z/Z20℃	0.75 to 1.25			
		+125℃ Z/Z20℃	0.75 to 1.25			
Endurance	125℃, 2,000h, Rated voltage applied	△C/C	Within ±20%			
		tan δ	2 times or less than an initial standard			
		ESR	2 times or less than an initial standard			
		LC	Below an initial standard			
Damp heat(Steady state)	85℃,85 to 95%RH, 1,000h, Rated voltage applied	△C/C	Within ±20%			
		tan δ	2 times or less than an initial standard			
		ESR	2 times or less than an initial standard			
		LC	Below an initial standard			
Resistance to soldering heat※2	VPS (230℃ X 75s)	△C/C	Within ±10%			
		tan δ	1.3 times or less than an initial standard			
		ESR	1.3 times or less than an initial standard			
		LC	Below an initial standard (after voltage processing)			

※1 In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 125°C .
※2 Please refer to page 84 for reflow soldering conditions.

Marking and dimensions

(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
C6	6.3	5.9	6.6	6.6	7.3	0.6 to 0.8	2.1
E7	8.0	6.9	8.3	8.3	9.0	0.6 to 0.8	3.2
F8	10.0	7.9	10.3	10.3	11.0	0.6 to 0.8	4.6
E12	8.0	11.9	8.3	8.3	9.0	0.8 to 1.1	3.2
F12	10.0	12.6	10.3	10.3	11.0	0.8 to 1.1	4.6

Size List

RV : Rated voltage

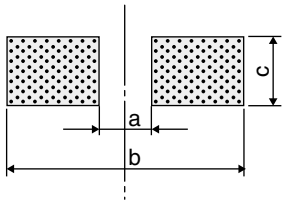
μF \ RV	10	16	25	35
8.2				E7
10			C6	
18				F8
22			E7	E12
39			F8	
47			E12	F12
56	C6			
82		E7	F12	

SVPD Series Characteristics List

Size Code	Part Number	Rated voltage (V)	Rated capacitance (μF)	ESR (mΩ) (max) 100kHz to 300kHz/20℃	Rated ripple current 100kHz (mArms)※1 105℃<Tx≦125℃	Allowable ripple current 100kHz (mArms)※1 Tx≦105℃	Tangent of loss angle (% max)	Leakage current (μA)(max) After 2 minutes
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

Large capacitance

Super low ESR

The SVPC series capacitor has larger capacitance than SVPA series. Adopt this series to reduce the size of equipment and circuits. This product can support lead free-reflow. ※2

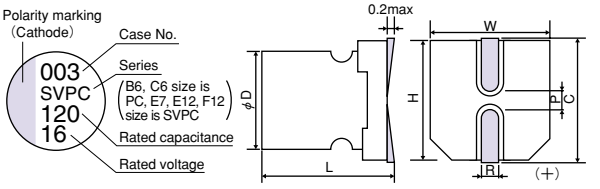
Specifications

Items	Condition		Specifications				
Rated voltage (V)	—		2.5	4.0	6.3	10	16
Surge voltage (V)	Room temperature		3.3	5.2	8.2	12	18.4
Category temperature range (℃)	—		−55 to +105				
Capacitance tolerance (%)	120Hz/20℃		M : ±20				
Dissipation Factor (DF)	120Hz/20℃		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℃		Please see the attached characteristics list				
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz, +20℃	−55℃ Z/Z20℃	0.75 to 1.25				
		+105℃ Z/Z20℃	0.75 to 1.25				
Endurance	105℃, 2,000h, Rated voltage applied	△C/C	Within ±20%				
		tan δ	1.5 times or less than an initial standard				
		ESR	1.5 times or less than an initial standard				
		LC	Below an initial standard				
Damp heat(Steady state)	60℃,90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20%				
		tan δ	1.5 times or less than an initial standard				
		ESR	1.5 times or less than an initial standard				
		LC	Below an initial standard (after voltage processing)				
Resistance to soldering heat※2	VPS (230℃ X 75s)	△C/C	Within ±10% (±15% for 2.5V 4.0V)				
		tan δ	1.3 times or less than an initial standard				
		ESR	1.3 times or less than an initial standard				
		LC	Below an initial standard (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 84 for reflow soldering conditions.

Marking and dimensions

(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
B6	5.0	5.9	5.3	5.3	6.0	0.6 to 0.8	1.4
C6	6.3	5.9	6.6	6.6	7.3	0.6 to 0.8	2.1
E7	8.0	6.9	8.3	8.3	9.0	0.6 to 0.8	3.2
E12	8.0	11.9	8.3	8.3	9.0	0.8 to 1.1	3.2
F12	10.0	12.6	10.3	10.3	11.0	0.8 to 1.1	4.6

Size List

RV : Rated voltage

μF \ RV	2.5	4.0	6.3	10	16
39					B6
68				B6	C6
100			B6		C6
120			B6	C6	E7
150		B6			E7
180	B6				
220			C6		
270				E7	E12
330		C6	C6		
390	C6		E7		
560	C6	E7,E12			
680	E7				
820	E12		E12		
1200		E12			
1500	E12	E12			
2700	F12				

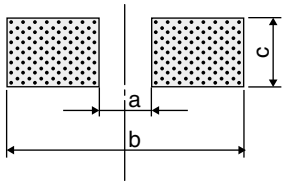
SVPC Series Characteristics List

Size Code	Part Number	Rated voltage (V)	Rated capacitance (μF)	ESR (mΩ) (max)		Rated ripple current 100kHz (mArms) at 105°C	Tangent of loss angle (% 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
	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

SVPB Series

Low profile

This is a low profile series based on the SVPA series. Suitable for miniaturizing devices and circuits. This product can support lead free-reflow.※2

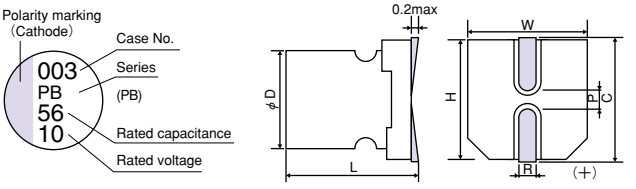
Specifications

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	18.4	23
Category temperature range (℃)	—		−55 to +105					
Capacitance tolerance (%)	120Hz/20℃		M : ±20					
Dissipation Factor (DF)	120Hz/20℃		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℃		Please see the attached characteristics list					
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz,+20℃	−55℃ Z/Z20℃	0.75 to 1.25					
		+105℃ Z/Z20℃	0.75 to 1.25					
Endurance	105℃, 1,000h, Rated voltage applied	△C/C	Within ±20%(±30% for C5 size)					
		tan δ	1.5 times or less than an initial standard					
		ESR	1.5 times or less than an initial standard					
		LC	Below an initial standard					
Damp heat(Steady state)	60℃,90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20%					
		tan δ	1.5 times or less than an initial standard					
		ESR	1.5 times or less than an initial standard					
		LC	Below an initial standard (after voltage processing)					
Resistance to soldering heat※2	VPS (230℃ X 75s)	△C/C	Within ±10% (±20% for C5 size)					
		tan δ	1.3 times or less than an initial standard					
		ESR	1.3 times or less than an initial standard					
		LC	Below an initial standard (after voltage processing)					

※1 In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 125°C .
※2 Please refer to page 84 for reflow soldering conditions.

Marking and dimensions

(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
C5	6.3	4.9	6.6	6.6	7.3	0.6 to 0.8	2.1
C55	6.3	5.4	6.6	6.6	7.3	0.6 to 0.8	2.1

Size List

RV : Rated voltage

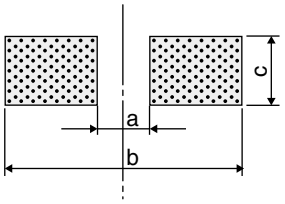
μF \ RV	2.5	4.0	6.3	10	16	20
15						C5
22						C55
33					C5	
56				C5		
82			C5			
100		C5				
120	C5					

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 (mArms) at 105°C	Tangent of loss angle (% 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

●The C5 size is also available upon request as a radial lead type. Please contact us if this type is required. Maximum height for radial lead types is 4.5 mm.
●The C55 size is also available upon request as 4.0V and 6.3V products.

Recommended land pattern dimension of PWB



(unit : mm)

Size Code	a	b	c
C5	2.1	9.1	1.6
C55	2.1	9.1	1.6

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 SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

SVPA Series

Low ESR

Large ripple current

This is a low ESR series based on the SVP series. Suitable for miniaturizing devices and circuits. This product can support lead free-reflow.※2

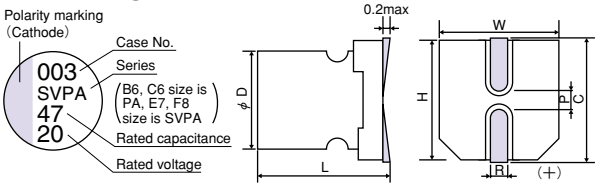
Specifications

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	18.4	23
Category temperature range (℃)	—		−55 to +105					
Capacitance tolerance (%)	120Hz/20℃		M : ±20					
Dissipation Factor (DF)	120Hz/20℃		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℃		Please see the attached characteristics list					
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz,+20℃	−55℃ Z/Z20℃	0.75 to 1.25					
		+105℃ Z/Z20℃	0.75 to 1.25					
Endurance	105℃, 2,000h, Rated voltage applied	△C/C	Within ±20%					
		tan δ	1.5 times or less than an initial standard					
		ESR	1.5 times or less than an initial standard					
		LC	Below an initial standard					
Damp heat(Steady state)	60℃,90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20%					
		tan δ	1.5 times or less than an initial standard					
		ESR	1.5 times or less than an initial standard					
		LC	Below an initial standard (after voltage processing)					
Resistance to soldering heat※2	VPS (230°C X 75s)	△C/C	Within ±10%					
		tan δ	1.3 times or less than an initial standard					
		ESR	1.3 times or less than an initial standard					
		LC	Below an initial standard (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 84 for reflow soldering conditions.

Marking and dimensions

(unit : mm)



Size Code	φ D±0.5	L +0.1 -0.4	W ±0.2	H ±0.2	C ±0.2	R	P ±0.2
B6	5.0	5.9	5.3	5.3	6.0	0.6 to 0.8	1.4
C6	6.3	5.9	6.6	6.6	7.3	0.6 to 0.8	2.1
E7	8.0	6.9	8.3	8.3	9.0	0.6 to 0.8	3.2
F8	10.0	7.9	10.3	10.3	11.0	0.6 to 0.8	4.6

Size List

RV : Rated voltage

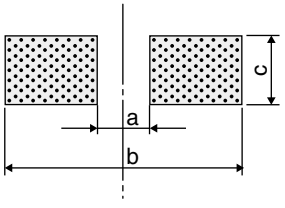
μF \ RV	2.5	4.0	6.3	10	16	20
10						B6
22						C6
39					C6	
47			B6			E7
68		B6		C6		
82	B6				E7	
120			C6			
150		C6		E7		
180	C6				F8	
220			E7			
270		E7				
330	E7			F8		
470			F8			
680		F8				
820	F8					

SVPA Series Characteristics List

Size Code	Part Number	Rated voltage (V)	Rated capacitance (μF)	ESR (mΩ) (max)		Rated ripple current 100kHz (mArms) at 105°C	Tangent of loss angle (% 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	c
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

OS-CON SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

SVQP Series

Guaranteed at 125℃

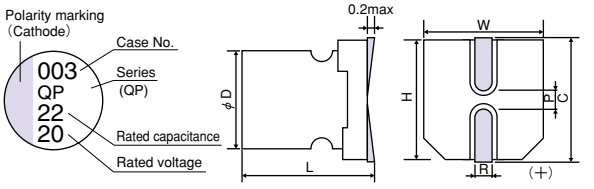
This series has advanced characteristics in resistance to heat compared with the SVP series. The SVQP series is best suited for devices that require enhanced reliability. This product can support lead free-reflow.※2

Specifications

Items	Condition		Specifications				
Rated voltage (V)	—		4.0	6.3	10	16	20
Surge voltage (V)	Room temperature		5.2	8.2	12	18.4	23
Category temperature range (℃)	—		−55 to +125				
Capacitance tolerance (%)	120Hz/20℃		M : ±20				
Dissipation Factor (DF)	120Hz/20℃		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℃		Please see the attached characteristics list				
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz, +20℃	−55℃ Z/Z20℃	0.75 to 1.25				
		+125℃ Z/Z20℃	0.75 to 1.25				
Endurance	125℃, 1,000h, Rated voltage applied	△C/C	Within ±20%				
		tan δ	2 times or less than an initial standard				
		ESR	2 times or less than an initial standard				
		LC	Below an initial standard				
Damp heat(Steady state)	60℃,90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20%				
		tan δ	1.5 times or less than an initial standard				
		ESR	1.5 times or less than an initial standard				
		LC	Below an initial standard (after voltage processing)				
Resistance to soldering heat※1	VPS (230℃ X 75s)	△C/C	Within ±10%				
		tan δ	1.3 times or less than an initial standard				
		ESR	1.3 times or less than an initial standard				
		LC	Below an initial standard (after voltage processing)				

※1 In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 125°C .
※2 Please refer to page 84 for reflow soldering conditions.

Marking and dimensions



(unit : mm)

Size Code	φ D ±0.5	L +0.1 -0.4	W ±0.2	H ±0.2	C ±0.2	R	P ±0.2
C6	6.3	5.9	6.6	6.6	7.3	0.6 to 0.8	2.1
E7	8.0	6.9	8.3	8.3	9.0	0.6 to 0.8	3.2

Size List

RV : Rated voltage

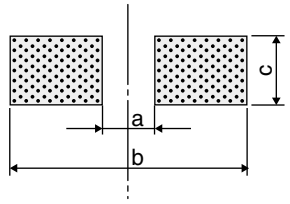
μF \ RV	4.0	6.3	10	16	20
22					C6
39				C6	
47					E7
56			C6		
82		C6		E7	
100		C6			
120			E7		
150	C6		E7		
220		E7			

■ SVQP 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) ※1 105°C<Tx≦125°C	Allowable ripple current 100kHz (mArms) ※1 Tx≦105°C	Tangent of loss angle (% max)	Leakage current (μA)(max) After 2 minutes
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 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

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 SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

SVP Series

Standard SMD type

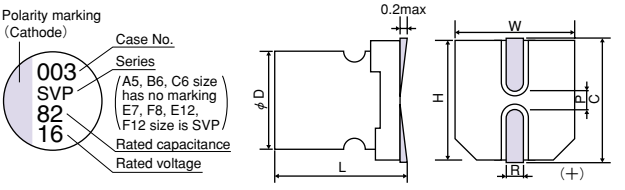
Standard SMD type product.
Use for surface mounted type switching power supplies. This product can support lead free-reflow.※2

Specifications

Items	Condition		Specifications
Rated voltage (V)	—		2.5 / 4.0 / 6.3 / 10 / 16 / 20 / 25
Surge voltage (V)	Room temperature		3.3 / 5.2 / 8.2 / 12 / 18.4 / 23 / 25
Category temperature range (℃)	—		−55 to +105
Capacitance tolerance (%)	120Hz/20℃		M : ±20
Dissipation Factor (DF)	120Hz/20℃		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℃		Please see the attached characteristics list
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz, +20℃	−55℃ Z/Z20℃	0.75 to 1.25
		+105℃ Z/Z20℃	0.75 to 1.25
Endurance	105℃, 2,000h, Rated voltage applied (25V → 20V applied)	△C/C	Within ±20%
		tan δ	1.5 times or less than an initial standard
		ESR	1.5 times or less than an initial standard
		LC	Below an initial standard
Damp heat(Steady state)	60℃,90 to 95%RH, 1,000h, No applied voltage	△C/C	Within ±20%
		tan δ	1.5 times or less than an initial standard
		ESR	1.5 times or less than an initial standard
		LC	Below an initial standard (after voltage processing)
Resistance to soldering heat※2	VPS (230℃ X 75s)	△C/C	Within ±10%
		tan δ	1.3 times or less than an initial standard
		ESR	1.3 times or less than an initial standard
		LC	Below an initial standard (after voltage processing)

※1 In case of some problems for measured values, measure after applying rated voltage for 2.5 to 20V products or 20V for 25V products for 120 minutes at 105°C .
※2 Please refer to page 84 for reflow soldering conditions.

Marking and dimensions



(unit : mm)

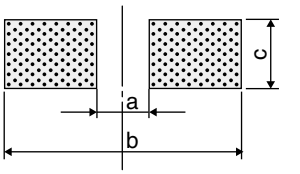
Size Code	φD ±0.5	L +0.1 -0.4	W ±0.2	H ±0.2	C ±0.2	R	P ±0.2
A5	4.0	5.4	4.3	4.3	5.0	0.6 to 0.8	1.0
B6	5.0	5.9	5.3	5.3	6.0	0.6 to 0.8	1.4
C6	6.3	5.9	6.6	6.6	7.3	0.6 to 0.8	2.1
E7	8.0	6.9	8.3	8.3	9.0	0.6 to 0.8	3.2
F8	10.0	7.9	10.3	10.3	11.0	0.6 to 0.8	4.6
E12	8.0	11.9	8.3	8.3	9.0	0.8 to 1.1	3.2
F12	10.0	12.6	10.3	10.3	11.0	0.8 to 1.1	4.6

Size List

RV : Rated voltage

μF \ RV	2.5	4.0	6.3	10	16	20	25
3.3					A5		
4.7				A5			
6.8				A5			C6
10				A5		B6	E7
15				A5	B6		
22			A5		B6	C6	F8
27						C6	
33		A5		B6		E7	E12
39		B6			C6		
47			B6	C6		E7	
56				C6	E7	F8	F12
68		B6				F8	
82			C6		E7		
100			C6		F8	E12	
120			C6	E7			
150		C6		E7,F8	F8	F12	
180					F8,E12		
220	C6		E7,F8				
270				F8			
330		E7	F8	F8,E12	F12		
470			F8,E12				
560		E12		F12			
680	E12	F8					
820			F12				
1200		F12					
1500	F12						

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
E12	2.8	11.1	1.9
F12	4.3	13.1	1.9

■ 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 (mArms) at 105°C	Tangent of loss angle (% max)	Leakage current (μA)(max) After 2 minutes
A5	16SVP3R3M	16	3.3	260	660	7	26.4
	10SVP4R7M	10	4.7	240	670	8	23.5
	10SVP6R8M	10	6.8	240	670	9	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	25SVP6R8M ※1	25	6.8	80	1200	10	85
	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	25SVP10M ※1	25	10	60	1500	10	125
	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	25SVP22M ※1	25	22	50	2000	10	275
	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
	6SVP470MX	6.3	470	25	3700	12	592
	4SVP680M	4.0	680	25	3700	12	544
E12	25SVP33M ※1	25	33	30	2980	12	413
	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
	4SVP560M	4.0	560	13	4520	15	448
	2R5SVP680M	2.5	680	13	4520	15	340
F12	25SVP56M ※1	25	56	28	3800	12	700
	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

※1 The surge voltage of 25V products is 25V. Please consider SVPD series 25V products (whose surge voltage is 29V) in placing a new order.

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 SANYO

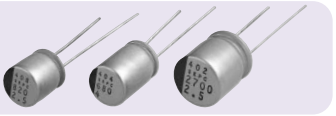
Conductive Polymer Type / Radial Lead Type

RoHS compliance

SEPC Series

Miniaturization and Low profile

Super low ESR | Large capacitance



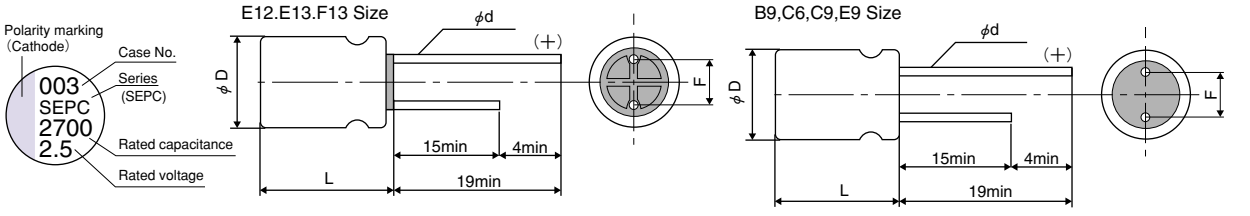
This is an even lower ESR series based on our SEP series. Suitable for use with motherboards, servers, VGA, etc. Lead free-flow is supported.

Specifications

Items	Condition		Specifications			
Rated voltage (V)	—		2.5	4.0	6.3	16
Surge voltage (V)	Room temperature		3.3	5.2	8.2	18.4
Category temperature range (℃)	—		−55 to +105			
Capacitance tolerance (%)	120Hz/20℃		M : ±20			
Dissipation Factor (DF)	120Hz/20℃		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℃		Please see the attached characteristics list			
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz, +20℃	−55℃ Z/Z20℃	0.75 to 1.25			
		+105℃ Z/Z20℃	0.75 to 1.25			
Endurance	105℃, 2,000h, Rated voltage applied	△C/C	Within ±20%			
		tan δ	1.5 times or less than an initial standard			
		ESR	1.5 times or less than an initial standard			
		LC	Below an initial standard			
Damp heat(Steady state)	60℃,90%RH, 1,000h, No-applied voltage	△C/C	Within ±20%			
		tan δ	1.5 times or less than an initial standard			
		ESR	1.5 times or less than an initial standard			
		LC	Below an initial standard (after voltage processing)			
Resistance to soldering heat	Flow method (260±5℃ X 10s)	△C/C	Within ±5%			
		tan δ	Below an initial standard			
		ESR	Below an initial standard			
		LC	Below an initial standard (after voltage processing)			

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

Marking and dimensions



B9,C6,C9,E9 size flat rubber is used.

Size List

RV : Rated voltage

μF \ RV	2.5	4.0	6.3	16
100	B9			C6 , C9
180				E9 , E12
270				E12
330	B9 , C9			
390	C6			
470	B9		C9 , E9 , E13	F13
560	B9 , C9 , E9	C9 , E9 , E13	C9 , E9	
680		E13	F13	
820	C9 ,E9 , E13	F13		
1000	E9			
1500			F13	
2700	F13			

(unit : mm)

Size Code	φ D ±0.5	Lmax	F	φ d ±0.05
B9	5.0	9.0	2.0±0.5	0.6
C6	6.3	6.0	2.5±0.5	0.45 ※
C9	6.3	9.0	2.5±0.5	0.6
E9	8.0	9.0	3.5±0.5	0.6
E12	8.0	12.0	3.5±0.5	0.6
E13	8.0	13.0	3.5±0.5	0.6
F13	10.0	13.0	5.0±0.5	0.6

※ 2SEPC390M : 0.5±0.05

■ 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 (mArms) at 105°C	Tangent of loss angle (% 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
C6	16SEPC100M	16	100	24	2490	10	320
	2SEPC390M	2.5	390	10	3900	12	500
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
E9	16SEPC180MX	16	180	10	5000	10	576
	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

OS-CON SANYO

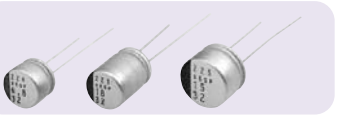
Conductive Polymer Type / Radial Lead Type

RoHS compliance

SEQP Series

125℃ guaranteed

32V product



This series has advanced characteristics in resistance to heat compared with the SEP series, and adds a rated voltage of 32V. Suitable for use in increasing device reliability, 32V products may be used on 16 to 24V line industrial devices. Lead free-flow is supported.

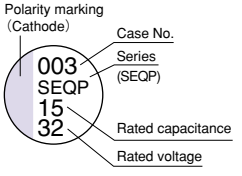
Specifications

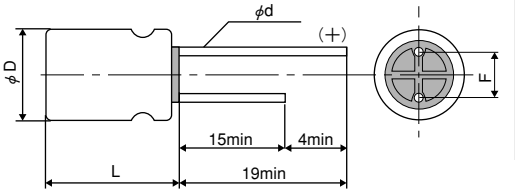
Items	Condition		Specifications					
Rated voltage (V)	—		4.0	6.3	10	16	20	32
Surge voltage (V)	Room temperature		5.2	8.4	12	18.4	23	37
Category temperature range (℃)	—		−55 to +125					
Capacitance tolerance (%)	120Hz/20℃		M : ±20					
Dissipation Factor (DF)	120Hz/20℃		Please see the attached characteristics list					
Leakage current※1	Rated voltage applied, after 2 minutes		Please see the attached characteristics list					
Equivalent series resistance (ESR)	100kHz to 300kHz/20℃		Please see the attached characteristics list					
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz, +20℃	−55℃ Z/Z20℃	0.75 to 1.25					
		+125℃ Z/Z20℃	0.75 to 1.25					
Endurance	125℃, 1,000h, Rated voltage applied	△C/C	Within ±20%					
		tan δ	2 times or less than an initial standard					
		ESR	2 times or less than an initial standard					
		LC	Below an initial standard					
Damp heat(Steady state)	60℃,90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20%					
		tan δ	1.5 times or less than an initial standard					
		ESR	1.5 times or less than an initial standard					
		LC	Below an initial standard (after voltage processing)					
Resistance to soldering heat※2	Flow method (260±5℃ X 10s)	△C/C	Within ±5%					
		tan δ	Below an initial standard					
		ESR	Below an initial standard					
		LC	Below an initial standard (after voltage processing)					

※1 In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 125°C .

Marking and dimensions

(unit : mm)





Size Code	φ D ±0.5	Lmax	F	φ d ±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

μF \ RV	4.0	6.3	10	16	20	32
6.8						E7
15						F8
18						E12
22					C6	
39				C6		
47					E7	
56			C6			
68					F8	
82		C6		E7		
100					E12	
120			E7			
150	C6	E7		F8	F13	
180				E12		
270			F8			
330	E7	F8	E12	F13		
470		E12				
560	E12		F13			
680	F8					
820		F13				
1200	F13					

SEQP 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)※1 105°C<Tx≦125°C	Allowable ripple current 100kHz (mArms)※1 Tx≦105°C	Tangent of loss angle (% max)	Leakage current (μA)(max) After 2 minutes
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 Tx : Ambient temperature

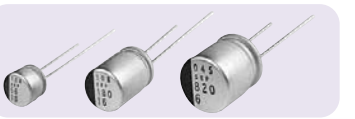
Frequency coefficient for ripple current

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

SEP Series

Standard radial lead type

Guaranteed at 105℃ for 3,000h



This is a radial lead type using conductive polymer based on the SVP series. Lead free-flow is supported.

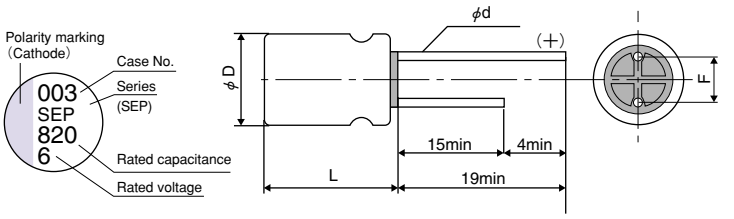
Specifications

Items	Condition		Specifications						
Rated voltage (V)	—		2.5	4.0	6.3	10	16	20	25
Surge voltage (V)	Room temperature		3.3	5.2	8.2	12	18.4	23	25
Category temperature range (℃)	—		−55 to +105						
Capacitance tolerance (%)	120Hz/20℃		M : ±20						
Dissipation Factor (DF)	120Hz/20℃		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℃		Please see the attached characteristics list						
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz, +20℃	−55℃ Z/Z20℃	0.75 to 1.25						
		+105℃ Z/Z20℃	0.75 to 1.25						
Endurance	105℃, 3,000h, Rated voltage applied (2.5V → 2,000h) (25V → 20V applied)	△C/C	Within ±20%						
		tan δ	1.5 times or less than an initial standard						
		ESR	1.5 times or less than an initial standard						
		LC	Below an initial standard						
Damp heat(Steady state)	60℃,90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20%						
		tan δ	1.5 times or less than an initial standard						
		ESR	1.5 times or less than an initial standard						
		LC	Below an initial standard (after voltage processing)						
Resistance to soldering heat	Flow method (260±5℃ X 10s)	△C/C	Within ±5%						
		tan δ	Below an initial standard						
		ESR	Below an initial standard						
		LC	Below an initial standard (after voltage processing)						

※1 In case of some problems for measured values, measure after applying rated voltage for 2.5 to 20V products or temperature derating voltage for 25V products for 120 minutes at 105°C .

Marking and dimensions

(unit : mm)



Size Code	ϕD ±0.5	Lmax	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

μF \ RV	2.5	4.0	6.3	10	16	20	25
6.8							C6
10							E7
22						C6	F8
33						E7	E12
39					C6		
47						E7	
56				C6		F8	F13
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				
1200		F13					
1500	F13						

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 (mArms) at 105°C	Tangent of loss angle (% max)	Leakage current (μA)(max) After 2 minutes
C6	25SEP6R8M ※1	25	6.8	80	1200	10	170
	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	25SEP10M ※1	25	10	60	1500	10	250
	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
F8	25SEP22M ※1	25	22	50	2000	10	275
	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	25SEP33M ※1	25	33	30	2980	12	413
	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
F13	25SEP56M ※1	25	56	28	3800	12	700
	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 The surge voltage of 25V products is 25V. Please consider SVPD series 25V products (whose surge voltage is 29V) in placing a new order.

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 SANYO

Organic Semiconductive Electrolyte Type / Radial Lead Type RoHS compliance

SF Series

Radial lead type.5mm height (max.)

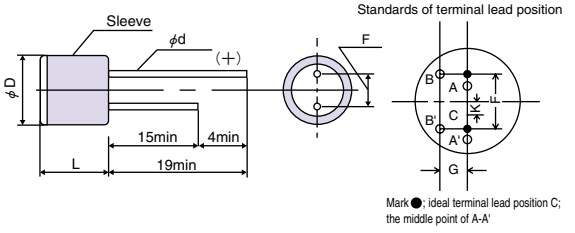
The SF series is low-profile, having a maximum height of 5mm.
Use this series for smooth power supply of notebook PCs. Lead free-flow is supported.

Specifications

Items	Condition		Specifications	
Rated voltage (V)	—		4.0	6.3
Surge voltage (V)	Room temperature		5.2	8.2
Category temperature range (℃)	—		−55 to +105	
Capacitance tolerance (%)	120Hz/20℃		M : ±20	
Dissipation Factor (DF)	120Hz/20℃		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℃		Please see the attached characteristics list	
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz, +20℃	−55℃ Z/Z20℃	0.75 to 1.25	
		+105℃ Z/Z20℃	0.75 to 1.25	
Endurance	105℃, 2,000h, Rated voltage applied	△C/C	Within ±20%	
		tan δ	1.5 times or less than an initial standard	
		LC	Below an initial standard	
Damp heat(Steady state)	60℃,90 to 95%RH, No-applied voltage 500h,	△C/C	Within ±20%	
		tan δ	2 times or less than an initial standard	
		LC	Below an initial standard	
Resistance to soldering heat	Flow method (260±5℃ X 10s)	△C/C	Within ±5%	
		tan δ	1.5 times or less than an initial standard	
		LC	Below an initial standard (after voltage processing)	

※1 In case of some problems for measured values, measure after applying rated voltage for 30 minutes at 105℃ .

Dimensions



(unit : mm)

Size Code	φ D +0.5max	Lmax	F	φ d ±0.05
E1	8.0	5.0	3.5±0.5	0.6

Size List

RV : Rated voltage

μF \ RV	4.0	6.3
150		E1
220	E1	

■ SF Series Characteristics List

Size Code	Part Number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20°C	Allowable ripple current (mArms)※1	Tangent of loss angle (% max)	Leakage current (μA)(max) After 2 minutes
E1	6SF150M	6.3	150	32	2420	7	189
	4SF220M	4.0	220	30	2510	7	176

※1 100kHz, +45°C

Temperature coefficient for allowable ripple current

Ambient Temp.	Tx≦45°C	45°C＜Tx≦65°C	65°C＜Tx≦85°C	85°C＜Tx≦95°C	95°C＜Tx≦105°C
Coefficient	1	0.85	0.7	0.4	0.25

Frequency coefficient for allowable ripple current

Frequency	120Hz≦ f ＜1kHz	1kHz≦ f ＜10kHz	10kHz≦ f ＜100kHz	100kHz≦ f ≦500kHz
Coefficient	0.05	0.2	0.5	1

OS-CON SANYO

Organic Semiconductive Electrolyte Type / Radial Lead Type RoHS compliance

SP Series

Large Capacitance | Low ESR | Optimum for Audio etc

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.

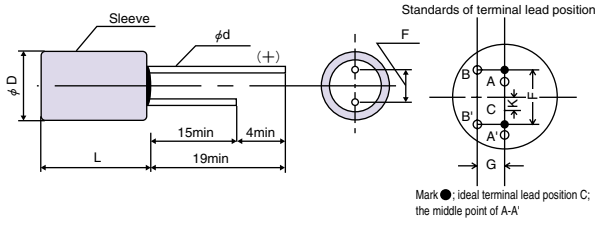
Specifications

Items	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	12	18.4	23	25
Category temperature range (℃)	—		−55 to +105							
Capacitance tolerance (%)	120Hz/20℃		M : ±20							
Dissipation Factor (DF)	120Hz/20℃		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℃		Please see the attached characteristics list							
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz, +20℃	−55℃ Z/Z20℃	0.75 to 1.25							
		+105℃ Z/Z20℃	0.75 to 1.25							
Endurance※3	105℃, 1,000 to 2,000h, Rated voltage applied (25V → 20V applied) ※1	△C/C	Within ±20%							
		tan δ	1.5 times or less than an initial standard							
		LC	Below an initial standard							
Damp heat(Steady state)	60℃,90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20%							
		tan δ	2 times or less than an initial standard							
		LC	Below an initial standard							
Resistance to soldering heat	Flow method (260±5°C X 10s)	△C/C	Within ±5%							
		tan δ	1.5 times or less than an initial standard							
		LC	Below an initial standard (after voltage processing)							

※1 Please reduce 0.25V per 1℃ from over 85℃ 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℃.
※3 C', E', F', C, D size : 1,000h. E, F, F0, G size : 2,000h. (2.0V, 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
F0	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					
1000	F		F					
1200		F						
1500			Fo					
1800	Fo							
2200			G					

SP Series Characteristics List

Size Code	Part Number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20°C	Allowable ripple current (mArms)※1	Tangent of loss angle (% max)	Leakage current (μA)(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
F0	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.	Tx≦45°C	45°C＜Tx≦65°C	65°C＜Tx≦85°C	85°C＜Tx≦95°C	95°C＜Tx≦105°C
Coefficient	1	0.85	0.7	0.4	0.25

Frequency coefficient for allowable ripple current

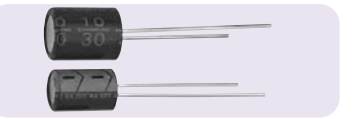
Frequency	120Hz≦ f ＜1kHz	1kHz≦ f ＜10kHz	10kHz≦ f ＜100kHz	100kHz≦ f ≦500kHz
Coefficient	0.05	0.2	0.5	1

OS-CON SANYO

Organic Semiconductive Electrolyte Type / Radial Lead Type RoHS compliance

SC Series

Standard radial lead type



Suitable for noise limiters and switching power supplies that make a point of high frequency characteristics. Also, make use of it when needed long life span and high reliability.
Lead free-flow is supported.

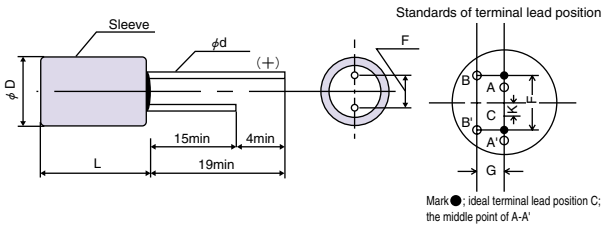
Specifications

Items	Condition		Specifications				
Rated voltage (V)	—		6.3	10	16	25	30
Surge voltage (V)	Room temperature		7.2	12	18.4	25	34.5
Category temperature range (℃)	—		−55 to +105				
Capacitance tolerance (%)	120Hz/20℃		M : ±20				
Dissipation Factor (DF)	120Hz/20℃		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℃		Please see the attached characteristics list				
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz, +20℃	−55℃ Z/Z20℃	0.75 to 1.25				
		+105℃ Z/Z20℃	0.75 to 1.25				
Endurance	105℃, 2,000h, Rated voltage applied (25V → 20V applied)※1	△C/C	Within ±20%				
		tan δ	1.5 times or less than an initial standard				
		LC	Below an initial standard				
Damp heat(Steady state)	60℃,90 to 95%RH, 1,000h, No applied voltage	△C/C	Within ±10%				
		tan δ	1.5 times or less than an initial standard				
		LC	Below an initial standard				
Resistance to soldering heat	Flow method (260±5℃ X 10s)	△C/C	Within ±5%				
		tan δ	Below an initial standard				
		LC	Below an initial standard (after voltage processing)				

※1 Please reduce 0.25V per 1℃ from over 85℃ for 25V products.
※2 In case of some problems for measured values, measure after applying rated voltage for 6.3 to 16 and 30V products or temperature derating voltage for 25V products for 30 minutes at 105℃.

Dimensions

(unit : mm)



Size Code	φD +0.5max	Lmax	F	φd ±0.05	Gmax	Kmax
A	4.0	7.8	2.0±0.5	0.45	0.5	0.5
B	5.0	7.8	2.0±0.5	0.45	0.5	0.5
C	6.3	7.8	2.5±0.5	0.45	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

Size List

RV : Rated voltage

μF \ RV	6.3	10	16	25	30
1.0				A	A
1.5				A	B
2.2			A	B	B
3.3			A	B	C
4.7		A	B	C	D
6.8	A		B	C	D
10		B		C	E
15	B		C	D	
22		C	D	E	F
33	C		D	F	
47		D		F	

SC Series Characteristics List

Size Code	Part Number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20°C	Allowable ripple current (mArms) ※1	Tangent of loss angle (% max)	Leakage current (μA)(max) After 2 minutes
A	30SC1M	30	1.0	350	430	3	1
	25SC1M	25	1.0	350	430	3	0.5
	25SC1R5M	25	1.5	300	435	3	0.5
	16SC2R2M	16	2.2	280	450	4	0.5
	16SC3R3M	16	3.3	280	500	4	0.53
	10SC4R7M	10	4.7	280	540	5	0.5
	6SC6R8M	6.3	6.8	250	560	5	0.5
B	30SC1R5M	30	1.5	300	435	3	1
	30SC2R2M	30	2.2	250	695	3	1.32
	25SC2R2M	25	2.2	200	695	3	0.55
	25SC3R3M	25	3.3	200	700	3	0.83
	16SC4R7M	16	4.7	180	720	4	0.75
	16SC6R8M	16	6.8	150	745	4	1.09
	10SC10M	10	10	150	780	5	1
	6SC15M	6.3	15	120	815	5	0.95
C	30SC3R3M	30	3.3	200	820	3	1.98
	25SC4R7M	25	4.7	100	1130	3	1.18
	25SC6R8M	25	6.8	100	1140	3	1.7
	25SC10M	25	10	90	1150	3	2.5
	16SC15M	16	15	90	1230	4	2.4
	10SC22M	10	22	70	1270	5	2.2
	6SC33M	6.3	33	70	1320	5	2.08
D	30SC4R7M	30	4.7	120	1300	4	2.82
	30SC6R8M	30	6.8	120	1340	4	4.08
	25SC15M	25	15	70	1650	4	3.75
	16SC22M	16	22	70	1800	5	3.52
	16SC33M	16	33	70	1900	6	5.28
	10SC47M	10	47	60	2020	6	4.7
E	30SC10M	30	10	110	1380	6	6
	25SC22M	25	22	40	2330	6	5.5
F	30SC22M	30	22	80	1830	6	13.2
	25SC33M	25	33	35	2900	6	8.25
	25SC47M	25	47	35	2980	6	11.75

※1 100kHz, +45°C

Temperature coefficient for allowable ripple current

Ambient Temp.	Tx≦45°C	45°C＜Tx≦65°C	65°C＜Tx≦85°C	85°C＜Tx≦95°C	95°C＜Tx≦105°C
Coefficient	1	0.85	0.7	0.4	0.25

Frequency coefficient for allowable ripple current

Frequency	120Hz≦ f ＜1kHz	1kHz≦ f ＜10kHz	10kHz≦ f ＜100kHz	100kHz≦ f ≦500kHz
Coefficient	0.05	0.2	0.5	1

OS-CON SANYO

Organic Semiconductive Electrolyte Type / Radial Lead Type RoHS compliance

SA Series

Large capacitance

Miniaturization

SA series is miniaturized SC series with large capacitance. Suitable for high frequency switching power supplies, etc. Lead free-flow is supported.

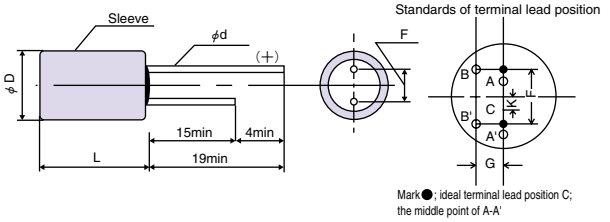
Specifications

Items	Condition		Specifications			
Rated voltage (V)	—		6.3	10	16	20
Surge voltage (V)	Room temperature		7.2	12	18.4	23
Category temperature range (℃)	—		−55 to +105			
Capacitance tolerance (%)	120Hz/20℃		M : ±20			
Dissipation Factor (DF)	120Hz/20℃		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℃		Please see the attached characteristics list			
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz, +20℃	−55℃ Z/Z20℃	0.75 to 1.25			
		+105℃ Z/Z20℃	0.75 to 1.25			
Endurance	105℃, 2,000h, Rated voltage applied	△C/C	Within ±20%			
		tan δ	1.5 times or less than an initial standard			
		LC	Below an initial standard			
Damp heat(Steady state)	60℃,90 to 95%RH, 1,000h, No applied voltage	△C/C	Within ±10%			
		tan δ	1.5 times or less than an initial standard			
		LC	Below an initial standard			
Resistance to soldering heat	Flow method (260±5°C X 10s)	△C/C	Within ±5%			
		tan δ	Below an initial standard			
		LC	Below an initial standard (after voltage processing)			

※1 In case of some problems for measured values, measure after applying rated voltage for 30 minutes at 105°C.

Dimensions

(unit : mm)



Size Code	φD +0.5max	Lmax	F	φd ±0.05	Gmax	Kmax
C	6.3	7.8	2.5±0.5	0.45	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
G	12.5	23.0	5.0±1.0	0.80	0.8	0.8
H	16.0	26.0	7.5±1.0	0.80	0.8	0.8

Size List

RV : Rated voltage

μF \ RV	6.3	10	16	20
15				C
22				C
33			C	D
47	C		D	E
68		D		E
100			E	F
150	E		F	
220		F		
330	F			
470			G	
1000			H	
2200	H			

SA Series Characteristics List

Size Code	Part Number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20°C	Allowable ripple current (mArms) ※1	Tangent of loss angle (% max)	Leakage current (μA)(max) After 2 minutes
C	20SA15M	20	15	90	1200	6	6
	20SA22M	20	22	70	1300	6	8.8
	16SA33M	16	33	70	1370	6	10.56
	6SA47M	6.3	47	60	1430	7	5.92
D	20SA33M	20	33	70	1710	6	13.2
	16SA47M	16	47	60	1830	6	15.04
	10SA68M	10	68	50	2000	7	13.6
E	20SA47M	20	47	40	2450	6	18.8
	20SA68M	20	68	36	2600	6	27.2
	16SA100M	16	100	30	2740	6	32
	6SA150M	6.3	150	30	2780	7	18.9
F	20SA100M	20	100	30	3210	6	40
	16SA150M	16	150	28	3260	6	48
	10SA220M	10	220	27	3370	7	44
	6SA330M	6.3	330	25	3500	7	41.58
G	16SA470M	16	470	20	6080	8	300.8
H	16SA1000M	16	1000	15	9750	9	640
	6SA2200M	6.3	2200	15	9750	13	554.4

※1 100kHz, +45°C

Temperature coefficient for allowable ripple current

Ambient Temp.	Tx≦45°C	45°C＜Tx≦65°C	65°C＜Tx≦85°C	85°C＜Tx≦95°C	95°C＜Tx≦105°C
Coefficient	1	0.85	0.7	0.4	0.25

Frequency coefficient for allowable ripple current

Frequency	120Hz≦ f ＜1kHz	1kHz≦ f ＜10kHz	10kHz≦ f ＜100kHz	100kHz≦ f ≦500kHz
Coefficient	0.05	0.2	0.5	1

OS-CON SANYO

Organic Semiconductive Electrolyte Type / Radial Lead Type RoHS compliance

SL Series

Low-profile products

The SL series is low profile with a category upper limit temperature of 105℃.
Use the SL series for compact and slim designs, such as VTRs, video cameras, etc.
Lead free-flow is supported.

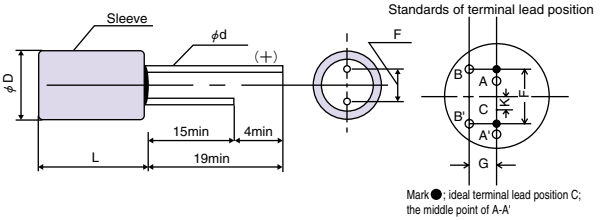
Specifications

Items	Condition			Specifications				
Rated voltage (V)	—			4.0	6.3	10	16	25
Surge voltage (V)	Room temperature			4.6	7.2	12	18.4	25
Category temperature range (℃)	—			−55 to +105				
Capacitance tolerance (%)	120Hz/20℃			M : ±20				
Dissipation Factor (DF)	120Hz/20℃			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℃			Please see the attached characteristics list				
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz, +20℃	−55℃	Z/Z20℃	0.75 to 1.25				
		+105℃	Z/Z20℃	0.75 to 1.25				
Endurance	105℃, 2,000h, Rated voltage applied (E', F' size : 1,000h) (25V → 20V applied)※1	△C/C		Within ±20%				
		tan δ		1.5 times or less than an initial standard				
		LC		Below an initial standard				
Damp heat(Steady state)	60℃,90 to 95%RH, 1,000h, No-applied voltage	△C/C		Within ±20%				
		tan δ		2 times or less than an initial standard				
		LC		Below an initial standard				
Resistance to soldering heat	Flow method (260±5℃ X 10s)	△C/C		Within ±5%				
		tan δ		1.5 times or less than an initial standard				
		LC		Below an initial standard (after voltage processing)				

※1 Please reduce 0.25V per 1℃ from over 85℃ for 25V products.
※2 In case of some problems for measured values, measure after applying rated voltage for 4.0 to 16V products or temperature derating voltage for 25V products for 30 minutes at 105℃.

Dimensions

(unit : mm)



Size Code	φ D +0.5max	Lmax	F	φ d ±0.05	Gmax	Kmax
A'	4.0	6.0	1.5±0.5	0.45	0.5	0.5
B'	5.0	6.0	2.0±0.5	0.45	0.5	0.5
C'	6.3	6.0	2.5±0.5	0.45	0.5	0.5
E'	8.0	6.0	3.5±0.5	0.50	0.8	0.8
F'	10.0	6.0	5.0±0.5	0.50	0.8	0.8

Size List

RV : Rated voltage

μF \ RV	4.0	6.3	10	16	25
1.0					A'
1.5					A'
2.2				A'	B'
3.3				A'	B'
4.7			A'	B'	C'
6.8		A'		B'	C'
10			B'	C'	
15		B'		C'	E'
22			C'		F'
33			C'		
47			C'	E'	
68			E'	F'	
100		E'	F'		
150	E'	F'			
220	F'				

SL Series Characteristics List

Size Code	Part Number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20°C	Allowable ripple current (mArms) ※1	Tangent of loss angle (% max)	Leakage current (μA)(max) After 2 minutes
A'	25SL1M	25	1	450	430	5	0.5
	25SL1R5M	25	1.5	400	435	5	0.75
	16SL2R2M	16	2.2	400	450	5	0.7
	16SL3R3M	16	3.3	400	500	6	1.06
	10SL4R7M	10	4.7	400	540	6	0.94
	6SL6R8M	6.3	6.8	350	560	6	0.86
B'	25SL2R2M	25	2.2	250	695	5	1.1
	25SL3R3M	25	3.3	250	700	5	1.65
	16SL4R7M	16	4.7	250	720	5	1.5
	16SL6R8M	16	6.8	180	745	5	2.18
	10SL10M	10	10	150	780	5	2
	6SL15M	6.3	15	120	815	6	1.89
C'	25SL4R7M	25	4.7	100	1130	6	2.35
	25SL6R8M	25	6.8	100	1140	6	3.4
	16SL10M	16	10	100	1150	6	3.2
	16SL15M	16	15	100	1230	6	4.8
	10SL22M	10	22	80	1270	6	4.4
	10SL33M	10	33	80	1350	6	6.6
	10SL47M	10	47	70	1430	6	9.4
E'	25SL15M	25	15	75	1400	7	7.5
	16SL47M	16	47	70	1550	7	15.04
	10SL68M	10	68	65	1600	7	13.6
	6SL100M	6.3	100	65	1600	7	12.6
	4SL150M	4.0	150	60	2000	7	12
F'	25SL22M	25	22	70	1600	7	11
	16SL68M	16	68	65	1850	7	21.76
	10SL100M	10	100	60	2100	7	20
	6SL150M	6.3	150	60	2100	7	18.9
	4SL220M	4.0	220	55	2400	7	17.6

※1 100kHz, +45°C

Temperature coefficient for allowable ripple current

Ambient Temp.	Tx≦45°C	45°C＜Tx≦65°C	65°C＜Tx≦85°C	85°C＜Tx≦95°C	95°C＜Tx≦105°C
Coefficient	1	0.85	0.7	0.4	0.25

Frequency coefficient for allowable ripple current

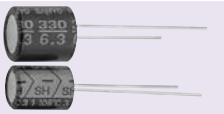
Frequency	120Hz≦ f ＜1kHz	1kHz≦ f ＜10kHz	10kHz≦ f ＜100kHz	100kHz≦ f ≦500kHz
Coefficient	0.05	0.2	0.5	1

OS-CON SANYO

Organic Semiconductive Electrolyte Type / Radial Lead Type RoHS compliance

SH Series

Long Life (105℃ X 5,000h)



SH series has a long life (guaranteed at 105℃ for 5,000h) with keeping high frequency characteristics. Please use the SH series for industrial equipment that requires high reliability. Lead free-flow is supported.

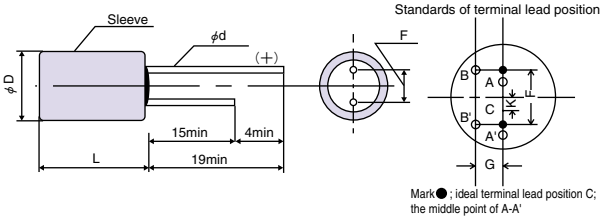
Specifications

Items	Condition		Specifications				
Rated voltage (V)	—		6.3	10	16	20	25
Surge voltage (V)	Room temperature		7.2	12	18.4	23	25
Category temperature range (℃)	—		−55 to +105				
Capacitance tolerance (%)	120Hz/20℃		M : ±20				
Dissipation Factor (DF)	120Hz/20℃		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℃		Please see the attached characteristics list				
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz, +20℃	−55℃ Z/Z20℃	0.75 to 1.25				
		+105℃ Z/Z20℃	0.75 to 1.25				
Endurance	105℃, 5,000h, Rated voltage applied (25V → 20V applied)※1	△C/C	Within ±30%				
		tan δ	1.5 times or less than an initial standard				
		LC	5 times or less than an initial standard				
Damp heat(Steady state)	60℃,90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±10%				
		tan δ	1.5 times or less than an initial standard				
		LC	Below an initial standard				
Resistance to soldering heat	Flow method (260±5℃ X 10s)	△C/C	Within ±5%				
		tan δ	Below an initial standard				
		LC	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 6.3 to 20V products or temperature derating voltage for 25V products for 30 minutes at 105°C .

Dimensions

(unit : mm)



Size Code	φD +0.5max	Lmax	F	φd ±0.05	Gmax	Kmax
A	4.0	7.8	2.0±0.5	0.45	0.5	0.5
B	5.0	7.8	2.0±0.5	0.45	0.5	0.5
C	6.3	7.8	2.5±0.5	0.45	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

Size List

RV : Rated voltage

μF \ RV	6.3	10	16	20	25
1.0					A
1.5					A
2.2			A		B
3.3			A		B
4.7		A	B		C
6.8	A		B		C
10		B			C
15	B			C	D
22				C	
33			C	D	
47	C		D	E	
68		D		E	
100			E	F	
150	E		F		
220		F			
330	F				

SH Series Characteristics List

Size Code	Part Number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20°C	Allowable ripple current (mArms)※1	Tangent of loss angle (% max)	Leakage current (μA)(max) After 2 minutes
A	25SH1M	25	1.0	350	430	3	0.5
	25SH1R5M	25	1.5	300	435	3	0.75
	16SH2R2M	16	2.2	280	450	4	0.7
	16SH3R3M	16	3.3	280	500	4	1.06
	10SH4R7M	10	4.7	280	540	5	0.94
	6SH6R8M	6.3	6.8	250	560	5	0.86
B	25SH2R2M	25	2.2	200	695	3	1.1
	25SH3R3M	25	3.3	200	700	3	1.65
	16SH4R7M	16	4.7	180	720	4	1.5
	16SH6R8M	16	6.8	150	745	4	2.18
	10SH10M	10	10	150	780	5	2
	6SH15M	6.3	15	120	815	5	1.89
C	25SH4R7M	25	4.7	100	1130	3	2.35
	25SH6R8M	25	6.8	100	1140	3	3.4
	25SH10M	25	10	90	1150	3	5
	20SH15M	20	15	90	1200	5	6
	20SH22M	20	22	70	1300	5	8.8
	16SH33M	16	33	70	1370	6	10.56
	6SH47M	6.3	47	60	1430	7	5.92
D	25SH15M	25	15	70	1650	4	7.5
	20SH33M	20	33	70	1710	6	13.2
	16SH47M	16	47	60	1830	6	15.04
	10SH68M	10	68	50	2000	7	13.6
E	20SH47M	20	47	40	2450	6	18.8
	20SH68M	20	68	36	2600	6	27.2
	16SH100M	16	100	30	2740	6	32
	6SH150M	6.3	150	30	2780	7	18.9
F	20SH100M	20	100	30	3210	6	40
	16SH150M	16	150	28	3260	6	48
	10SH220M	10	220	27	3370	7	44
	6SH330M	6.3	330	25	3500	7	41.58

※1 100kHz, +45°C

Temperature coefficient for allowable ripple current

Ambient Temp.	Tx≦45°C	45°C<Tx≦65°C	65°C<Tx≦85°C	85°C<Tx≦95°C	95°C<Tx≦105°C
Coefficient	1	0.85	0.7	0.4	0.25

Frequency coefficient for allowable ripple current

Frequency	120Hz≦ f <1kHz	1kHz≦ f <10kHz	10kHz≦ f <100kHz	100kHz≦ f ≦500kHz
Coefficient	0.05	0.2	0.5	1

OS-CON SANYO

Organic Semiconductive Electrolyte Type / Radial Lead Type RoHS compliance

SS Series

Miniaturization of SC, SA and SL series

SS series is a miniaturized version of SC, SA and SL series. Suitable for switching power supplies, etc. to make more compact.
Lead free-flow is supported.

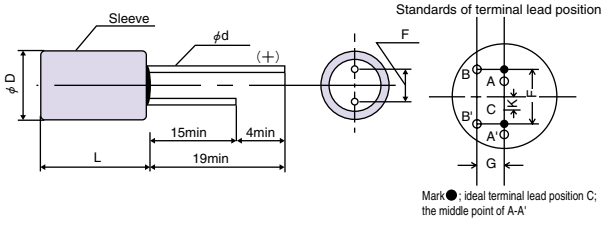
Specifications

Items	Condition		Specifications				
Rated voltage (V)	—		4.0	6.3	10	16	20
Surge voltage (V)	Room temperature		4.6	7.2	12	18.4	23
Category temperature range (℃)	—		−55 to +105				
Capacitance tolerance (%)	120Hz/20℃		M : ±20				
Dissipation Factor (DF)	120Hz/20℃		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℃		Please see the attached characteristics list				
Characteristics of impedance ratio at high temp. and low temp.	Based the value at 100kHz, +20℃	−55℃ Z/Z20℃	0.75 to 1.25				
		+105℃ Z/Z20℃	0.75 to 1.25				
Endurance	105℃, 1,000h, Rated voltage applied (E, F size : 2,000h)	△C/C	Within ±20%				
		tan δ	1.5 times or less than an initial standard				
		LC	Below an initial standard				
Damp heat(Steady state)	60℃,90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20%				
		tan δ	2 times or less than an initial standard				
		LC	Below an initial standard				
Resistance to soldering heat	Flow method (260±5°C X 10s)	△C/C	Within ±5%				
		tan δ	1.5 times or less than an initial standard				
		LC	Below an initial standard (after voltage processing)				

※1 In case of some problems for measured values, measure after applying rated voltage for 30 minutes at 105°C .

Dimensions

(unit : mm)



Size Code	φD +0.5max	Lmax	F	φd ±0.05	Gmax	Kmax
A'	4.0	6.0	1.5±0.5	0.45	0.5	0.5
B'	5.0	6.0	2.0±0.5	0.45	0.5	0.5
C'	6.3	6.0	2.5±0.5	0.45	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

Size List

RV : Rated voltage

μF \ RV	4.0	6.3	10	16	20
2.2					A'
3.3					A'
4.7				A'	B'
6.8				A'	B'
10			A'	B'	C'
15		A'		B'	C'
22			B'		C'
33		B'		C'	
47					D
68	C'			D	
100			D		E
150	D		E		F
220		E			
330			F		
470	F				

■ SS Series Characteristics List

Size Code	Part Number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20°C	Allowable ripple current (mArms) ※1	Tangent of loss angle (% max)	Leakage current (μA)(max) After 2 minutes
A'	20SS2R2M	20	2.2	400	450	5	2.2
	20SS3R3M	20	3.3	400	500	6	3.3
	16SS4R7M	16	4.7	400	540	6	3.76
	16SS6R8M	16	6.8	400	540	6	5.44
	10SS10M	10	10	350	560	6	5
	6SS15M	6.3	15	350	560	6	4.73
B'	20SS4R7M	20	4.7	250	720	5	4.7
	20SS6R8M	20	6.8	180	745	5	6.8
	16SS10M	16	10	150	780	5	8
	16SS15M	16	15	150	780	5	12
	10SS22M	10	22	150	780	5	11
	6SS33M	6.3	33	150	780	5	10.4
C'	20SS10M	20	10	100	1150	6	10
	20SS15M	20	15	100	1230	6	15
	20SS22M	20	22	100	1230	6	22
	16SS33M	16	33	100	1230	6	26.4
	4SS68M	4.0	68	70	1430	6	13.6
D	20SS47M	20	47	60	1830	6	47
	16SS68M	16	68	50	2000	7	54.4
	10SS100M	10	100	40	2100	7	50
	4SS150M	4.0	150	40	2100	8	30
E	20SS100M	20	100	30	2740	7	100
	10SS150M	10	150	30	2780	7	75
	6SS220M	6.3	220	30	3000	7	69.3
F	20SS150M	20	150	30	3200	7	150
	10SS330M	10	330	25	3500	7	165
	4SS470M	4.0	470	25	3500	7	94

※1 100kHz, +45°C

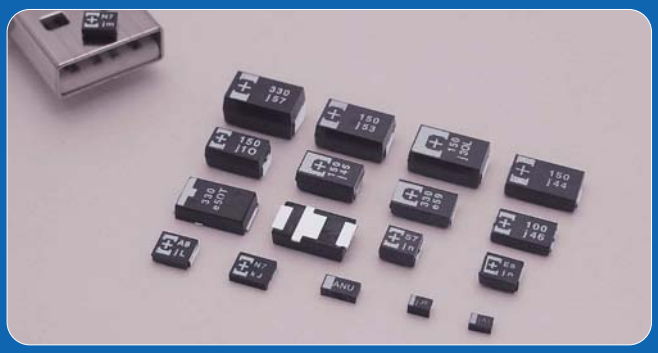
Temperature coefficient for allowable ripple current

Ambient Temp.	Tx≦45°C	45°C＜Tx≦65°C	65°C＜Tx≦85°C	85°C＜Tx≦95°C	95°C＜Tx≦105°C
Coefficient	1	0.85	0.7	0.4	0.25

Frequency coefficient for allowable ripple current

Frequency	120Hz≦ f ＜1kHz	1kHz≦ f ＜10kHz	10kHz≦ f ＜100kHz	100kHz≦ f ≦500kHz
Coefficient	0.05	0.2	0.5	1

M E M O



POSCAP

POSCAP is a solid electrolytic chip capacitor. The Anode is sintered Tantalum and the Cathode is a highly conductive polymer formed on SANYO Original method.
POSCAP has a Lowest ESR (Equivalent Series Resistance) level and excellent performance for high frequency though low profile and high capacitance.
In addition, it has high reliability and high heat resistance.
Therefore, POSCAP is an ideal chip capacitor especially for digital, high frequency devices.

Features

- **Lead free**
  - Terminal plating is Palladium and Gold. It's completely lead free.
- **Low profile chip capacitor**
- **Low impedance and low ESR at high frequency**
- **High ripple current capability**
- **Long Life 105℃×2,000Hrs*** ★A part of the model is excluded.
- **Excellent noise-absorbent characteristics**
- **Excellent temperature characteristics up to –55℃**
- **The rush current is guaranteed for 20A**
- **Superior to Ta-Cap in safety**

Applications

- **DC/DC Converter**
- **Personal Computers**
- **VCR, Camcorder, Digital Still Camera**
- **Portable Communications Devices and Base Station**
- **PDA (Portable terminals, etc.)**
- **Navigation System**
- **HD Drive, MO Drive, DVD Drive**

Series integration and termination

① **The AP series is end of production.**

② **Please make note that all models from TPA series as well as the 16V TPB・TPC series, some models of the TPD series are being integrated into the following series.**

Discontinued series	Integrated series
TPA	TPB
TPB (16TPB47M,16TPB47ML)	TQC(16TQC47M)
TPC (16TPC33M)	TQC(16TQC33M)
10TPD150M	10TPF150ML
6TPD330M	6TPF330M9L
6TPD220M	6TPF220ML

Discontinued series	Integrated series
4TPD470M	4TPF470ML
4TPD330M	4TPF330ML
2R5TPD680M	2R5TPF680ML
2R5TPD680M8	2R5TPF680M7L
2R5TPD470M	2R5TPF470ML
2R5TPD470M8	2R5TPF470M7L

③ **The following discontinued models of the TPB, TPE, TPU series are integrated into the following integrated models. Our company continue the supply to the customer who has already used it.**

Discontinued models	Integrated models
10TPB100M	10TPB100ML
6TPB150M	6TPB150ML
4TPB220M	4TPB220ML
2R5TPB330M	2R5TPB330ML
6TPE150MPC	6TPE150MPC2
4TPE220MPC	4TPE220MPC2
4TPE220MIC	4TPE220MIC2

Discontinued models	Integrated models
2R5TPE330MPC	2R5TPE330MPC2
2R5TPE330MIC	2R5TPE330MIC2
2R5TPE330MFC	2R5TPE330MFC2
8TPU33MBI	10TPU33MAI
6TPU47MBI	6TPU47MAI
4TPU68MBI	4TPU68MAI

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■ **Conductive Polymer Type**
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POSCAP is uniquely structured solid electrolytic capacitor.
Please note the following points in order to take full advantage of the POSCAP's performance and ensure the most stable quality possible. (The crucial precautions is described to page 3 to 5)

Circuit designing cautions

1. Check the rated performance

After checking the operation and installation environments,
design the circuit so that it falls whithin the rated performance range stipulated in this delivery specification.

2. Operating temperature and ripple current

(a) Set the operating temperature so that it falls within the range stipulated in this delivery specification.

(b) Do not supply current that exceeds the allowable ripple current. When excessive ripple current is supplied, internal heat increases and reduces the POSCAP's life span.

3. Leakage current

Even when the soldering conditions fall within the range of this delivery specifications,
leakage current increases a little on occasion. It also increases a little during high temperature storage,
high humidity storage and temperature cycling with no voltage applied. In cases such as these,
leakage current will decrease by applying voltage under the condition of below the POSCAP's maximum operating temperature. The speed at which the leakage current is restored is increased by applying voltage when the POSCAP's temperature is close to the maximum operating temperature.

4. Prohibited circuits

Since problems can be expected, the POSCAP cannot be used on the following circuits.

(1) High impedance voltage retention circuits
(2) Coupling circuits
(3) Time constant circuits
(4) Circuits greatly affected by leakage current
(5) The circuit in which two or more POSCAP are connected in a series so as to raise the endurance voltage.

5. Sudden charge and discharge restricted

Sudden charge and discharge are restricted (for maintainance of high-proof reliability).
A protection circuit is recommended for when a sudden charge or discharge causes excessive rush current since this is main cause of short circuit and large leakage current.
Use protection circuits in case the rush current value exceeds 20A.※
Be sure to insert a protection resistor of about 1kΩ for charge and discharge when measuring the leakage current.

※ When TH series use under the ambient temperature more than 105℃ : 10A

6. Protect circuit

The failure mode of POSCAP is the short mode. When it breaks down, short electric current flows to it.
POSCAP gives off heat by this short current. Do the following consideration in design fully for the safety because it has a bad influence on the part around POSCAP due to this heat.
: A protection circuit and a protection device are set up, and it is made safer as a system.
: A diffuse circuit and so on is set up, and a safe system is taken so that a machine may not break down as to the single trouble.

7. Reduction of failure stress

When POSCAP is used within the rated voltage, it shows a stable characteristic,
but it may be damaged in a short circuit when an overvoltage, for instance, is applied.
The time to reach the failure mode can be extended by using POSCAP with reduced ambient temperature, ripple current and applied voltage.

Failure rate

- **In the case of the endurance which is 105°C×2,000h.**
  0.5%/1,000h (Environment temp. : 105°C, Rated voltage or Category voltage applied)
- **In the case of the endurance which is 105°C×1,000h or 125°C×1,000h.**
  1.0%/1,000h (Environment temp. : 105°C, Rated voltage or Category voltage applied)
- **In the case of the endurance which is 85°C×1,000h.**
  1.0%/1,000h (Environment temp. : 85°C, Rated voltage applied)

8. Considerations when soldering

The soldering conditions are to be within the range prescribed in this delivery specification.
If the specifications are not followed, there is the possibility of the appearance becoming defective when soldering is conducted under conditions that are harsher that those stipulated.

9. Others

Design circuits after checking the following items.
Electrical characteristics are affected by temperature and frequency fluctuations.
Design circuits after checking the amount of fluctuation.

Compensation coefficient of maximum allowable ripple current

It takes advantage in ripple current value of characteristics list and the following coefficient.
(For questions regarding TQC series, please ask separately.)

Frequency compensation coefficient

(TPB,TPC,TPD,TPE,TPF,TPG,TPL,TPLF,TPSF,TPU,TA,THseries)

	120Hz≤f<1kHz	1kHz≤f<10kHz	10kHz≤f<100kHz	100kHz≤f<1MHz
22μF≤C≤100μF	0.20	0.60	0.85	1.00
100μF≤C≤330μF	0.25	0.70	0.85	1.00
330μF≤C≤1000μF	0.30	0.75	0.90	1.00

Temperature compensation coefficient

(TPB,TPC,TPD,TPE,TPF,TPG,TPL,TPLF,TPSF,TPU,TA,THseries)

	Case size code	
	S08, S11, A09, B09, B1,B1G,B15G, B2, C, C1, C2, C3, D12T, D15T, D2, D2E, D2T, D3L, D3, D4(THD), D4D	D4
T≤45°C	1.00	1.00
45°C<T≤85°C	0.70	0.50
※85°C<T≤105°C	0.25	0.25

T :Environment temperature
※ THseries :85°C<T≤125°C

Storage Conditions

It is necessary to set an environment to prevent a trouble at the time of soldering by the degradation of solder ability or moisture's getting into the molding resin when POSCAP are stored.

(Please refer to page 4. about the general storage conditions)

The storage period is 18 month or shorter after shipment, under the condition that is un opened the storage bag.
(TQC series : 9 months from the pass mark on the label)

Please unsel storage bag just befor mounting and be conscious that POSCAP not remain.
When remainder unfortunately occurs, return them to storage bag once again and,
please seal the unsealing part by adhesive tape etc., including desiccants. More over, once open the strage bag, it should be followed the table's Floor Life "Time" and "condtions"

Level	Floor Life		Applications scope	
	Time	Conditions	Size code	Series
2a	4 weeks	≦30℃／60%RH	D12T,D15T,D2E,D2,D2T, D3L,D3,D4,D4D	TPB,TPC,TPE,TPD TH※ ,TPL,TPLF
3	168 hours	≦30℃／60%RH	S08,S11,A09,B09,B1, B1G,B15G,B2,B2S,C1,C3,C,C2	TPB,TPC,TPE,TPG,TPSF TPU,TA,TQC（ALL sizes）
4	72 hours	≦30℃／60%RH	D2	
5	48 hours	≦30℃／60%RH	D2E,D2,D3L,D4	TH

(Conform to IPC/JEDEC J-STD-020C)
※Use at 105℃ or less

NOTE:The model of MSL "2a" is changed into MSL "3" with the 260℃ reflow soldering.

POSCAP SANYO

Series System Diagram

P.164-167

TPB
Standard Products

- D4 size — 2.5 to 10V, 220 to 1000µF
- D3L size — 2.5 to 10V, 100 to 680µF
- C size — 2.5 to 10V, 47 to 220µF
- B2 size — 2.5 to 10V, 33 to 220µF

P.168-170

TPC
Low Profile Products

- D2 size — 2.5 to 10V, 68 to 330µF
- C1 size — 2.5 to 8V, 33 to 100µF
- B1 size — 2.5 to 12.5V, 10 to 56µF

P.158-161

TPE
Low ESR Products

- D4 size — 2.5 to 10V, 330 to 1500µF
- D3L size — 2.5 to 10V, 220 to 680µF
- D2E size — 2.5 to 10V, 68 to 470µF
- C3 size — 6.3 to 10V, 150 to 220µF
- C2 size — 2.5 to 8V, 100 to 330µF
- B2 size — 2 to 10V, 47 to 330µF

P.154-155

TPL
Low ESR·Low ESL Products Face Down Terminal Type

- D2T size — 2.5V, 220 to 470µF
- D15T size — NEW — 2.5V to 6.3V, 150 to 330µF
- D12T size — NEW — 2 to 6.3V, 100 to 220µF

P.154-155

TPLF
Low ESR·Low ESL Products Face Down Terminal Type

- D2T size — 2V, 220 to 470µF

P.157

TPG
Small Size·High Capacitance Products

- B15G size — 4 to 6.3V, 150 to 220µF
- B1G size — 2.5 to 12.5V, 33 to 220µF

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TPU
Small Size·Low Profile Products Face Down Terminal Type

- B09 size — 6.3V, 150µF
- A09 size — 2.5 to 10V, 33 to 100µF
- S11 size — 2.5 to 6.3V, 22 to 47µF
- S08 size — 2.5 to 6.3V, 10 to 22µF

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TPD
Low ESR·High Capacitance Products

- D4D size — 2.5 to 6.3V, 470 to 1000µF

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TPF
Low ESR·High Capacitance Products

- D3L size — 2.5 to 10V, 150 to 680µF
- D2E size — 2V, 220 to 470µF

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TPSF
Low ESR·High Capacitance Small Size

- B2S size — NEW — 2.0V, 270µF

Series System Diagram

P.172-173

TH
125°C Guaranteed Products

- D4D size — 2.5 to 6.3V, 330 to 680µF 
- D4 size — 2.5 to 10V, 220 to 1000µF 
- D3L size — 2.5 to 10V, 100 to 470µF 
- D2 size — 2.5 to 6.3V, 68 to 220µF 
- D2E size — 2.5 to 8V, 150 to 330µF 

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TA
High Reliability Products (For The Car Electronics)

- D3L size — 2.5 to 10V, 150 to 680µF 
- D2E size — 2.5 to 10V, 68 to 470µF 
- B2 size — 4 to 10V, 47 to 100µF 

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TR
High Moisture Resistance Products

- Custom Products — 2.0 to 12.5V, 5.6 to 1500µF 

P.174

TQC
High Voltage Products

- D3 size — 16V, 100µF 
- D3L size — 16 to 25V, 33 to 68µF 
- D2 size — 16 to 25V, 15 to 47µF 
- C size — 16 to 25V, 10 to 22µF 
- B2 size — 16 to 25V, 5.6 to 10µF 

The size of each photo is close to full scale.

Products List

∗Under development ∗1(F:15, I:18, M:25) ∗2(C:12, F:15, I:18, M:25) ∗3(9, C:12, F:15, I:18, M:25) ∗4(5, 6, 8, 10)

•Symbols in table:Case Size
•( ):ESR specification(mΩmax.)

WV	Series \ μF	5.6	8.2	10	15	22	33	47	56	68	82	100
2V	TPE											
	TPE											
	TPF											
	TPL											
	TPLF											
	TPSF											
2.5V	TPB											B2 (70)
	TPB											
	TPC								B1 (70)		C1 (70)	
	TPD											
	TPE											
	TPE											
	TPE											
	TPE											
	TPF											
	TPG											
	TPL											
	TPL											
	TPU					S08 (250)		S11 (150)				A09 (150)
4V	TPB											
	TPB									B2 (70)		B2 (70,45)
	TPB											
	TPC								C1 (70)			C1 (55)
	TPC							B1 (70)				
	TPD											
	TPE											
	TPE											B2 (35)
	TPE											
	TPE											
	TPF											
	TPG											
	TPL											
	TPU				S08 (250)		S11 (150)					
	TPU									A09 (150)		
6.3V	TPB							B2 (70)		B2 (70)		B2 (55,45)
	TPB											
	TPB											C (45)
	TPC						B1 (70)	B1 (70)		C1 (55)		C1 (55)
	TPC											D2 (45)
	TPD											
	TPE											D2E (25,18)
	TPE											
	TPE											
	TPE											B2 (35,25)
	TPF											
	TPG									B1G (70)		B1G (70,55)
	TPL											D12T (25)
	TPU			S08 (250)		S11 (150)						
	TPU							A09 (150)				
8V	TPB						B2 (70)	B2 (70)			C (45)	
	TPC					B1 (70)	C1 (70)					
	TPE											C2 (25)
	TPG							B1G (70)				
	TPU											
10V	TPB						B2 (70)	C (55)		C (55)		
	TPB							B2 (70)				D3L (55)
	TPB											
	TPC						B1 (70)			D2 (45)		D2 (45)
	TPE							B2 (35)		D2E (25)		
	TPF											
	TPG						B1G (70)	B1G (70)				
	TPU						A09 (150)					
12.5V	TPC			B1 (80)	B1 (80)							
	TPG						B1G (70)					
16V	TQC			B2 (100)	B2 (90)	C (80)	D2 (70)	D2 (70)		D3L (50)		D3 (50)
	TQC							D3L (45)				
20V	TQC		B2 (100)		C (80)	D2 (80)	D2 (45)	D3L (55)				
25V	TQC	B2 (100)		C (95)	D2 (90,45)	D2 (90,45)	D3L (60)					

Products List

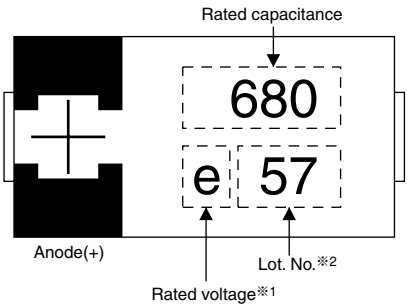
Case size

(Unit:mm)

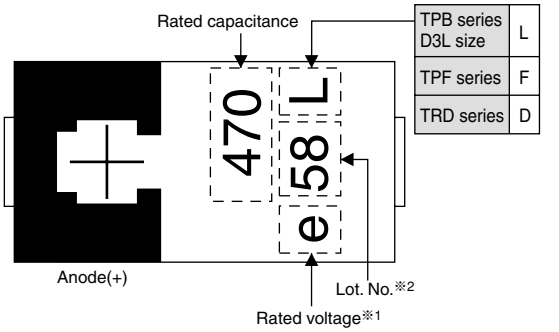
	S08	S11	A09	B09	B1	B1G	B15G	B2	B2S	C1	C2	C3	C	D2E	D12T	D15T	D2T	D2	D3L	D3	D4D	D4
L	2.0	2.0	3.2	3.5	3.5	3.5	3.5	3.5	3.5	6.0	6.0	6.0	6.0	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3
W	1.25	1.25	1.6	2.8	2.8	2.8	2.8	2.8	2.8	3.2	3.2	3.2	3.2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
H	0.8	1.1	0.9	0.9	1.1	1.1	1.4	1.9	1.9	1.4	1.8	2.5	2.8	1.8	1.1	1.4	1.8	1.9	2.8	3.1	3.6	3.8

WV	μF / Series	120	150	180	220	270	330	470	560	680	1000	1500
2V	TPE						B2 (18)					
	TPE						B2 (15,13)					
	TPF				D2E (6)		D2E (6)	D2E (6)				
	TPL				D12T (25)							
	TPLF				D2T (7,6)		D2T (7,6)	D2T (7,6,5)	D2T (6,5)			
	TPSF					B2S (9,12) *						
2.5V	TPB				C (45)					D4 (40)	D4 (30)	
	TPB				B2 (55)		D3L (55)	D3L (40)		D3L (40)		
	TPC				D2 (45)		D2 (40)					
	TPD							D4D (*4)		D4D (*4)	D4D (*4)	
	TPE						C2 (18,15,12,9)					
	TPE				D2E (*3)		D2E (*3)	D2E (*3)		D3L (*2)	D4 (*1)	D4 (15,12)
	TPE		B2 (35)		B2 (35,25,21,18)		B2 (35)					
	TPE				B2 (15,13)							
	TPF						D3L (7)	D3L (10,7)		D3L (10,7,6)		
	TPG				B1G (70)							
	TPL				D2T (12)		D2T(12,9,8,7)	D2T(12,9,8,7)				
	TPL				D15T (18)		D15T (15)					
	TPU											
4V	TPB		C (45)		C (45)			D4 (40)		D4 (35)		
	TPB		B2 (70)									
	TPB				D3L (55)		D3L (40)	D3L (40)				
	TPC		D2 (45)		D2 (40)							
	TPC											
	TPD									D4D (10)		
	TPE		D2E(25,18)		D2E (*1)		D2E(25,18)	D3L (*2)		D4 (*1)		
	TPE		B2 (35,30)		B2 (35)							
	TPE				C2 (25,18,15)							
	TPE											
	TPF						D3L (12)	D3L (10)				
	TPG		B1G (70)		B15G (70)							
	TPL		D12T (25)		D15T (20)							
	TPU											
	TPU											
6.3V	TPB											
	TPB		D3L (55)		D3L (40)		D3L (40)					
	TPB		C (45)				D4 (40)	D4 (35)				
	TPC											
	TPC		D2 (40)				D2 (40)					
	TPD							D4D (10)				
	TPE		D2E (25,18)		D2E (25,18)		D2E (25)	D4 (25,18)		D4 (25,18)		
	TPE				D2E (25)		D3L(25,18,15)					
	TPE		C2 (25,18)		C3 (25,18)							
	TPE	B2 (35)	B2 (35)									
	TPF				D3L (12)		D3L (9)					
	TPG		B15G (70)									
	TPL		D15T (25)									
	TPU		B09 (100)									
	TPU											
8V	TPB											
	TPC		D2 (40)									
	TPE											
	TPG											
	TPU											
10V	TPB				D4 (40)		D4 (35)					
	TPB		D3L (40)		D3L (40)							
	TPB				C (100)							
	TPC											
	TPE		C3 (55)	C3 (55)	D3L (25)		D4 (25)					
	TPF		D3L (15)									
	TPG											
	TPU											
12.5V	TPC											
	TPG											
16V	TQC											
	TQC											
20V	TQC											
25V	TQC											

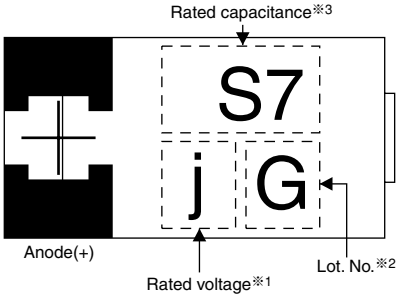
■C,C1,D2,D4 size (TPB,TPC,TH series)
■C,D2,D3,D3L size (TQC series)



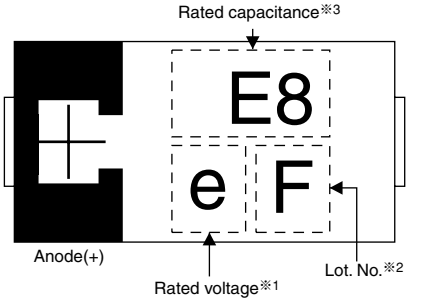
■C2,C3,D2E,D3L size (TPB,TPE,TPF series)
■D4,D4D size (TPD,TPE series)



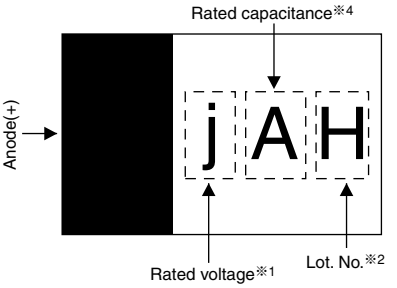
■B09,B1,B1G,B15G,B2 size
(TPB,TPG,TPU,TQC series)



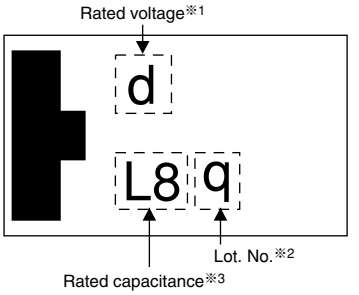
■B2 size (TPE series)



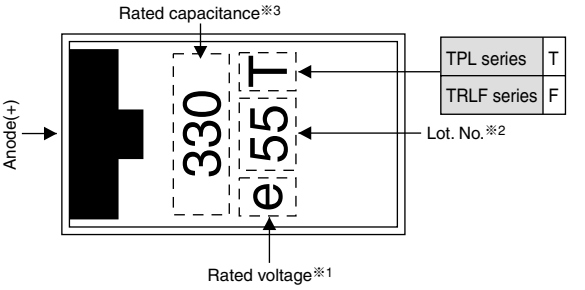
■S08,S11,A09 size (TPU series)



■B2S size (TPSF series)



■D2T,D15T,D12T size (TPL,TPLF series)



※1 The rated voltage is as follows.

R.V.	2.0	2.5	3.15	4.0	6.3	8.0	10	12.5	16	20	25
Mark	d	e	f	g	j	k	A	B	C	D	1E(orE)

※2 Lot.No.shows roughly manufacturing date.

※3 The rated capacitance is as follows.

Capacitance (μF)	5.6	8.2	10	22	33	47	56	68	100	120	150	220	270	330
Mark	U6	Y6	A7	J7	N7	S7	U7	W7	A8	C8	E8	J8	L8	N8

※4 The rated capacitance is as follows.(S08,S11,A09)

R. Cap. (μF)	10	15	22	33	47	68	100
Mark	A	E	J	N	S	W	A

Explanation of Part Numbers

■ Use the following example to define POSCAP part numbers.

2R5 — Rated voltage 1 to 3 figures

Rated voltage	Code
2.0	2
2.5	2R5
4.0	4
6.3	6
8.0	8
10	10
12.5	12
16	16
20	20
25	25

TPB — Series name 3 to 4 figures

Series	Code
TPB Series	TPB
TPC Series	TPC
TPD Series	TPD
TPE Series	TPE
TPF Series	TPF
TPG Series	TPG
TPL Series	TPL
TPLF Series	TPLF
TPSF Series	TPSF
TPU Series	TPU
TAB Series	TAB
TAC Series	TAC
TAD Series	TAD
TAE Series	TAE
THB Series	THB
THC Series	THC
THD Series	THD
THE Series	THE
TQC Series	TQC

330 — Rated capacitance 2 to 4 figures

Rated capacitance	Code
5.6	5R6
8.2	8R2
10	10
15	15
22	22
33	33
47	47
56	56
68	68
82	82
100	100
150	150
220	220
270	270
330	330
470	470
680	680
1000	1000
1500	1500

M — Capacitance tolerance 1 figure

Capacitance tolerance	Code
±20%	M

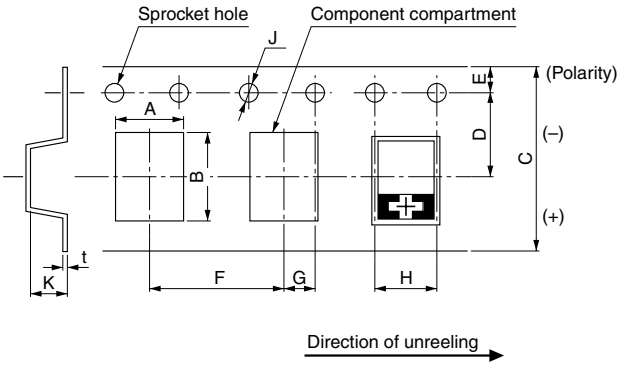
L — Special code 0 to 4 figures

Standard		Code
TPE Series		
B2 size	ESR 35mΩ max	ZB
	ESR 30mΩ max	UB
	ESR 25mΩ max	PB
	ESR 21mΩ max	LB
	ESR 18mΩ max	IB
	ESR 15mΩ max	FB
	ESR 15mΩ /300kHz max	FGB
	ESR 13mΩ /300kHz max	DGB
	ESR 35mΩ max 85°C	AZB
	ESR 30mΩ max 85°C	AUB
	ESR 25mΩ max 85°C	APB
	ESR 15mΩ max 85°C	AFB
	ESR 15mΩ /300kHz max 85°C	AFGB
	ESR 13mΩ /300kHz max 85°C	ADGB
C2 size	ESR 25mΩ max	PC2
	ESR 18mΩ max	IC2
	ESR 15mΩ max	FC2
	ESR 12mΩ max	CC2
	ESR 9mΩ max	9C2
C3 size	ESR 55mΩ max	GC
	ESR 25mΩ max	PC
	ESR 18mΩ max	IC
D2E size	ESR 25mΩ max 85°C	AP
D3L size	ESR 25mΩ max	L
	ESR 18mΩ max	IL
	ESR 15mΩ max	FL
	ESR 12mΩ max	CL

Standard		Code
TPB Series		
B2 Size	85°C	A
	ESR 45mΩ max	V
	ESR 45mΩ max 85°C	AV
C size		C
D3L size		L
TPC Series		
B1 size		B
C1 size		C
TPF Series		
D3L Size	ESR 9mΩ max	9L
	ESR 7mΩ max	7L
TPL Series		
D12T size		D
D15T Size	ESR 25mΩ max	U
	ESR 20mΩ max	KU
	ESR 18mΩ max	IU
	ESR 15mΩ max	FU
TPU Series		
S11 size		SK
A09 size		AI
B09 size		BI
All Series		
ESR 55mΩ max		G
ESR 45mΩ max		V
ESR 35mΩ max		Z
ESR 18mΩ max		I
ESR 15mΩ max		F
ESR 12mΩ max		C
ESR 9mΩ max		9
ESR 8mΩ max		8
ESR 6mΩ max		6
ESR 5mΩ max		5

*We supply only embossed taping type.

Dimension of carrier tape

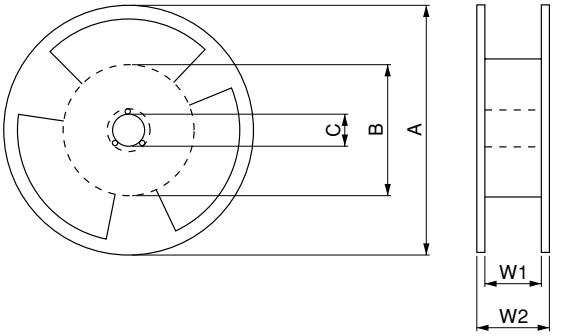


(unit:mm)

Size code	A ±0.1	B ±0.1	C ±0.3	D ±0.1	E ±0.1	F ±0.1	G ±0.1	H ±0.1	J $^{+0.1}_{-0}$	K ±0.2	t ±0.1
S08	1.65	2.4	8.0	3.5	1.75	4.0	2.0	4.0	ϕ1.5	1.0	0.25
S11	1.65	2.4	8.0	3.5	1.75	4.0	2.0	4.0	ϕ1.5	1.3	0.25
A09	2.05	3.65	8.0	3.5	1.75	4.0	2.0	4.0	ϕ1.5	1.3	0.25
B09	3.2	3.8	8.0	3.5	1.75	4.0	2.0	4.0	ϕ1.5	1.4	0.2
B1	3.2	3.8	8.0	3.5	1.75	4.0	2.0	4.0	ϕ1.5	1.4	0.2
B1G	3.25	3.9	8.0	3.5	1.75	4.0	2.0	4.0	ϕ1.5	1.7	0.25
B15G	3.25	3.9	8.0	3.5	1.75	4.0	2.0	4.0	ϕ1.5	1.7	0.25
B2	3.3	3.8	8.0	3.5	1.75	4.0	2.0	4.0	ϕ1.5	2.1	0.2
B2S	3.25	4.0	8.0	3.5	1.75	4.0	2.0	4.0	ϕ1.5	2.1	0.25
C1	3.7	6.4	12.0	5.5	1.75	8.0	2.0	4.0	ϕ1.5	1.7	0.3
C2	3.7	6.4	12.0	5.5	1.75	8.0	2.0	4.0	ϕ1.5	2.1	0.3
C3	3.7	6.4	12.0	5.5	1.75	8.0	2.0	4.0	ϕ1.5	2.9	0.3
C	3.7	6.4	12.0	5.5	1.75	8.0	2.0	4.0	ϕ1.5	3.2	0.3
D2E	4.5	7.5	12.0	5.5	1.75	8.0	2.0	4.0	ϕ1.5	2.4	0.3
D2T	4.5	7.8	12.0	5.5	1.75	8.0	2.0	4.0	ϕ1.5	2.4	0.3
D15T	4.7	7.8	12.0	5.5	1.75	8.0	2.0	4.0	ϕ1.5	1.7	0.3
D12T	4.7	7.8	12.0	5.5	1.75	8.0	2.0	4.0	ϕ1.5	1.7	0.3
D2	4.5	7.5	12.0	5.5	1.75	8.0	2.0	4.0	ϕ1.5	2.4	0.3
D3L	4.5	7.7	12.0	5.5	1.75	8.0	2.0	4.0	ϕ1.5	3.2	0.3
D3	4.5	7.5	12.0	5.5	1.75	8.0	2.0	4.0	ϕ1.5	3.5	0.3
D4	4.5	7.7	12.0	5.5	1.75	8.0	2.0	4.0	ϕ1.5	4.2	0.3
D4D	4.5	7.7	12.0	5.5	1.75	8.0	2.0	4.0	ϕ1.5	4.2	0.3

- Dimension A and B are the measure of compartment's inside bottom.
- The (+) Polarity of the chip is placed on right side towards the unreeling direction.
- Dimension of the topcover tape
  Thickness of cover tape: 62±10μm
  Width of cover tape: 9.5±0.2mm
  5.5±0.2mm (ϕ180reel)

Reel dimension



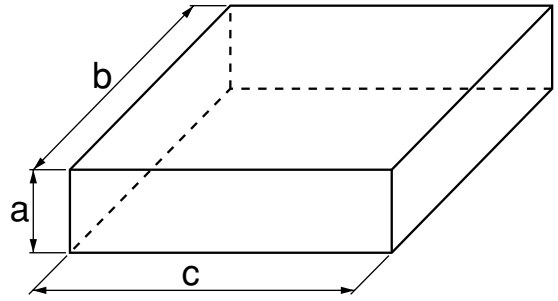
(unit:mm)

A	B	C	W1	W2
ϕ330±2	ϕ80±2	ϕ13±0.2	13.5±0.5	17.5±1.0
ϕ180 $^{+0}_{-3}$	ϕ60±2	ϕ13±0.2	9±0.5	11.4±1.0

Packing quantities

Size code	Pieces/reel (φ180)	Pieces/reel (φ330)	Size code	Pieces/reel (φ180)	Pieces/reel (φ330)
S08	4000	—	C3	—	2500
S11	3000	—	C	—	2500
A09	3000	—	D2E	—	3000
B09	3000	—	D2T	—	3000
B1	3000	—	D15T	—	4000
B1G	2500	—	D12T	—	4000
B15G	2500	—	D2	—	3000
B2	2000	—	D3L	—	2500
B2S	2000	—	D3	—	2500
C1	—	4000	D4	—	2000
C2	—	3000	D4D	—	2000

Dimension of packing case



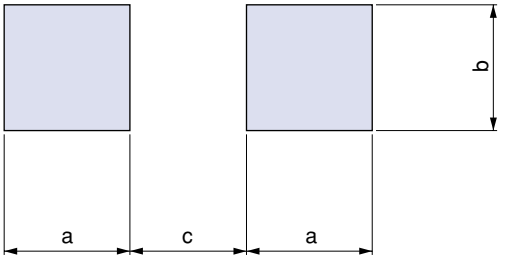
(unit:mm)

Reel size	φ180	φ330
a	90	120
b	240	360
c	240	360

Units per packing case

Size code	Pieces/case	Size code	Pieces/case
S08	20000	C3	12500
S11	15000	C	12500
A09	15000	D2E	15000
B09	15000	D2T	15000
B1	15000	D15T	20000
B1G	12500	D12T	20000
B15G	12500	D2	15000
B2	10000	D3L	12500
B2S	10000	D3	12500
C1	20000	D4	10000
C2	15000	D4D	10000

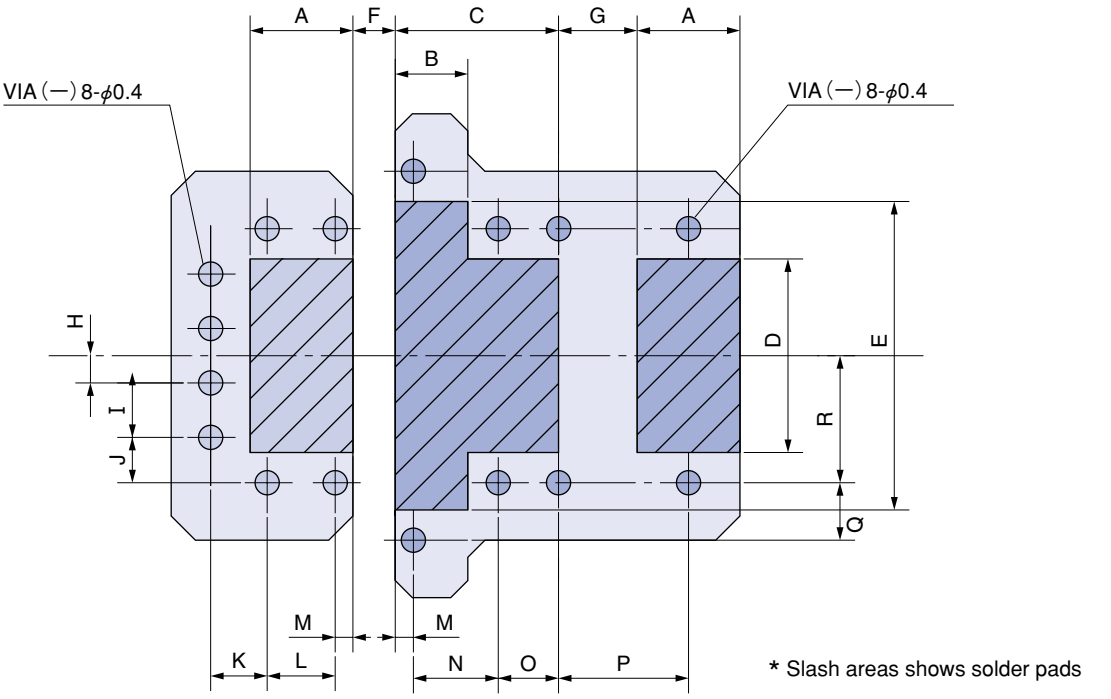
Except for TPL/TPLFseries



(unit:mm)

Size code	a	b	c
S08	1.0	0.9	0.6
S11	1.0	0.9	0.6
A09	1.6	1.2	1.2
B09	1.6	2.7	1.4
B1	1.6	2.7	1.4
B1G	1.6	2.7	1.4
B15G	1.6	2.7	1.4
B2	1.6	2.7	1.4
B2S	1.6	2.7	1.4
C1	2.4	2.3	2.4
C2	2.4	2.3	2.4
C3	2.4	2.3	2.4
C	2.4	2.3	2.4
D2E	2.4	2.9	3.7
D2	2.4	2.9	3.7
D3L	2.4	2.9	3.7
D3	2.4	2.9	3.7
D4	2.4	2.9	3.7
D4D	2.4	2.9	3.7

TPL/TPLFseries



* Slash areas shows solder pads

(1) Three-pad design for three-terminal model (TPL/TPLF series)

(unit:mm)

Size code	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
D2T/ D15T/ D12T	1.7	1.2	2.7	3.2	5.1	0.7	1.3	0.45	0.9	0.75	0.9	1.1	0.3	1.4	1.0	2.15	0.95	2.1

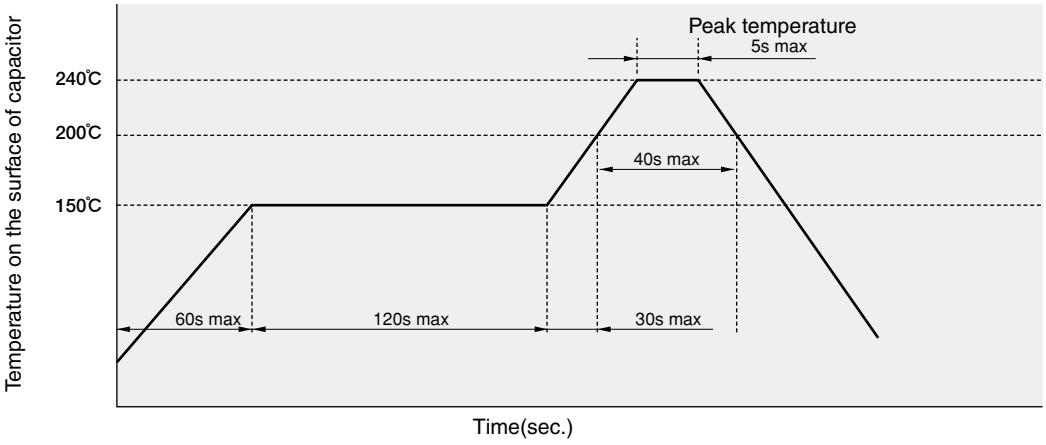
(2) Common three-pad design for POSCAP D-size two-terminal model

(unit:mm)

Size code	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
D common	2.2	1.2	2.7	2.9	5.1	0.5	1.0	0.45	0.9	0.75	1.4	1.1	0.3	1.4	1.0	2.15	0.95	2.1

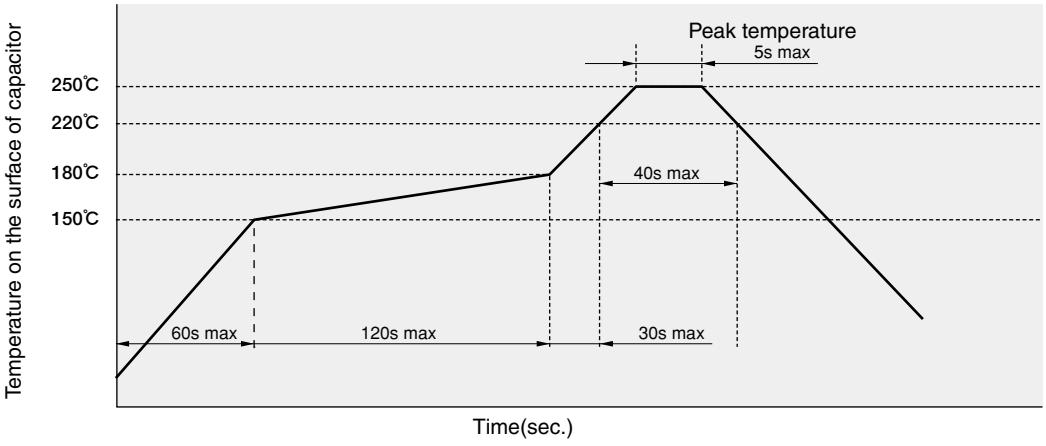
Recommended reflow soldering temperature profile

The cycles of reflow soldering: Twice (max)



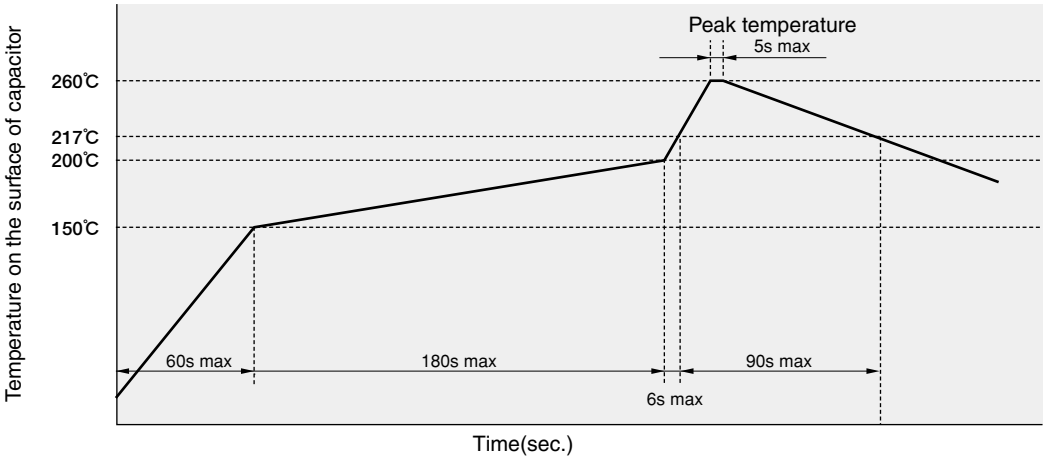
Peak temperature 250°C lead free reflow soldering profile

The cycles of reflow soldering: Twice (max)



Peak temperature 260°C lead free reflow soldering profile

・The model of MSL"2a" is changed into MSL "3" with this reflow condition.(See page 141)
The cycles of reflow soldering: Twice (max)



Soldering with a soldering iron

Tip of a soldering iron: 350℃ max　Power of a soldering iron: 30W max　Working time: 3sec. max
(Do not let the tip of soldering iron touch the POSCAP itself. Do not subject the POSCAP itself to excessive stress when soldering.)

POSCAP SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

TPSF Series

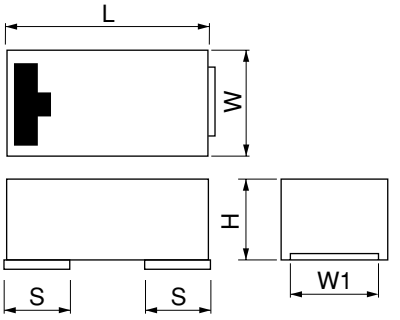
Low ESR · Small Size · High Capacitance
Face Down Terminal Type

TPSF series achieved small size, high capacitance and low ESR.

Specifications

Items	Condition		Specifications
Rated voltage (V)	—		2.0
Surge voltage (V)	—		2.6
Category temperature range (℃)	—		−55 to +105
Capacitance tolerance (%)	120Hz/20℃		M : ±20
Rated capacitance range (μF)	120Hz/20℃		270
Dissipation Factor (DF)	120Hz/20℃		Please see the attached characteristics list
Leakage current	Rated voltage applied, after 5 minutes		Please see the attached characteristics list
Equivalent series resistance (ESR)	100kHz/20℃		Please see the attached characteristics list
Characteristics of impedance ratio at high temp. and low temp.	100kHz/+20℃	−55℃ Z/Z20℃	0.6 to 2.0
		+105℃ Z/Z20℃	0.6 to 2.0
Endurance	105℃, 1,000h, rated voltage applied	△C/C	Within±20% of the initial value
		DF	≤ 1.5 times the initial limit
		LC	≤ The initial limit
Damp heat (Steady State)	60℃,90 to 95%RH,500h, No-applied voltage	△C/C	Within+40%,–20% of the initial value
		DF	≤ 1.5 times the initial limit
		LC	≤ 3 times the initial limit
Surge	85℃, 1,000 times, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value
		DF	≤ The initial limit
		LC	≤ 3 times the initial limit

Dimensions



(unit: mm)

Size code	L±0.2	W±0.2	H±0.1	S±0.2	W1±0.1
B2S	3.5	2.8	1.9	0.8	2.2

Size List

RV : Rated voltage

μF \ RV	2.0
270	B2S

TPSF Series Characteristics List

Size Code	SANYO Part number	Rated Voltage (V)	Rated Temperature (°C)	Rated Capacitance (μF)	Category Voltage (V)	Category Temperature (°C)	DF (%max)	LC (μA) max/5min.	ESR (mΩ max) 100kHz/20℃	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow Temp. ≤ 260°C	MSL Reflow Temp. ≤ 250°C
B2S	2TPSF270MC ※2	2.0	105	270	2.0	105	8.0	108	12	2300	3	3
	2TPSF270M9 ※2	2.0	105	270	2.0	105	8.0	108	9	2600		

Please refer to page 141 for the compensation coefficient of maximum allowable ripple current.

※1 100k～500kHz,45℃
※2 Under development

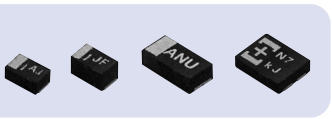
POSCAP SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

TPU Series

Small Size · Low Profile Products
Face Down Terminal Type

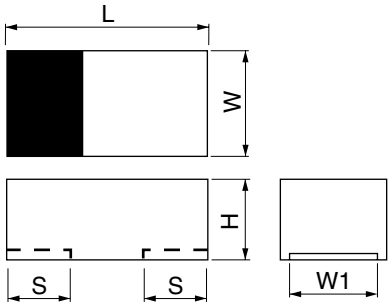


TPU series has a real advantage in size-sensitive applications using a face down terminal structure.

Specifications

Items	Condition		Specifications			
Rated voltage (V)	—		2.5	4.0	6.3	10
Surge voltage (V)	—		3.2	5.0	8.0	13
Category temperature range (℃)	—		−55 to +85			
Capacitance tolerance (%)	120Hz/20℃		M : ±20			
Rated capacitance range (μF)	120Hz/20℃		10 to 100			
Dissipation Factor (DF)	120Hz/20℃		Please see the attached characteristics list			
Leakage current	Rated voltage applied, after 5 minutes		Please see the attached characteristics list			
Equivalent series resistance (ESR)	100kHz/20℃		Please see the attached characteristics list			
Characteristics of impedance ratio at high temp. and low temp.	100kHz/+20℃	−55℃ Z/Z20℃	0.6 to 2.0			
		+85℃ Z/Z20℃	0.6 to 2.0			
Endurance	85℃, 1,000h, rated voltage applied	△C/C	Within±20% of the initial value			
		DF	≤ 1.5 times the initial limit			
		LC	≤ The initial limit			
Damp heat (Steady State)	60℃,90 to 95%RH,500h, No-applied voltage	△C/C	Within+40%,−20% of the initial value			
		DF	≤ 1.5 times the initial limit			
		LC	≤ 3 times the initial limit			
Surge	85℃, 1,000 times, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value			
		DF	≤ The initial limit			
		LC	≤ 3 times the initial limit			

Dimensions



(unit: mm)

Size code	L ±0.1※1	W ±0.1※1	H ±0.1	S ±0.1※1	W1 ±0.1
S08	2.0	1.25	0.8	0.5	0.9
S11	2.0	1.25	1.1	0.5	0.9
A09	3.2	1.6	0.9	0.8	1.2
B09	3.5	2.8	0.9	0.8	2.2

※1 ±0.2:A09,B09

Size List

RV : Rated voltage

μF \ RV	2.5	4.0	6.3	10
10			S08	
15		S08		
22	S08		S11	
33		S11		A09
47	S11		A09	
68		A09		
100	A09			
150			B09	

TPU Series Characteristics List

Size Code	SANYO Part number	Rated Voltage (V)	Rated Temperature (°C)	Rated Capacitance (μF)	Category Voltage (V)	Category Temperature (°C)	DF (%max)	LC (μA) max/5min.	ESR (mΩ max) 100kHz/20℃	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow Temp. ≤ 260°C	MSL Reflow Temp. ≤ 250°C
S08	6TPU10M	6.3	85	10	6.3	85	10.0	6.3	250	400	Under evaluation	3
	4TPU15M	4.0	85	15	4.0	85	10.0	6.0	250	400		
	2R5TPU22M	2.5	85	22	2.5	85	10.0	5.5	250	400		
S11	6TPU22MSK	6.3	85	22	6.3	85	10.0	13.9	150	510		
	4TPU33MSK	4.0	85	33	4.0	85	10.0	13.2	150	510		
	2R5TPU47MSK	2.5	85	47	2.5	85	10.0	11.8	150	510		
A09	10TPU33MAI	10	85	33	10	85	10.0	33.0	150	510	3	
	6TPU47MAI	6.3	85	47	6.3	85	10.0	29.6	150	510		
	4TPU68MAI	4.0	85	68	4.0	85	10.0	27.2	150	510		
	2R5TPU100MAI	2.5	85	100	2.5	85	10.0	25.0	150	510		
B09	6TPU150MBI※2	6.3	85	150	6.3	85	10.0	94.5	100	670		

Please refer to page 141 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45℃
※2 Under development

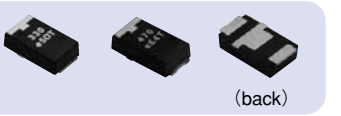
POSCAP SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

TPL·TPLF Series

Low ESR . Low ESL Products
Face Down Terminal Type

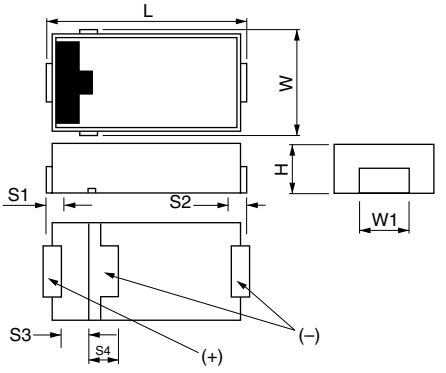


TPL series has a low ESL and low ESR advantage using an unique face down terminal structure.

Specifications

Items	Condition		Specifications			
Rated voltage (V)	—		2.0	2.5	4.0	6.3
Surge voltage (V)	—		2.6	3.2	5.0	8.0
Category temperature range (℃)	—		−55 to +105			
Capacitance tolerance (%)	120Hz/20℃		M : ±20			
Rated capacitance range (μF)	120Hz/20℃		220 to 560			
Dissipation Factor (DF)	120Hz/20℃		Please see the attached characteristics list			
Leakage current	Rated voltage applied, after 5 minutes		Please see the attached characteristics list			
Equivalent series resistance (ESR)	100kHz/20℃		Please see the attached characteristics list			
Characteristics of impedance ratio at high temp. and low temp.	100kHz/+20℃	−55℃ Z/Z20℃	0.6 to 2.0			
		+105℃ Z/Z20℃	0.6 to 2.0			
Endurance	105℃, 2,000h, rated voltage applied	△C/C	Within±20% of the initial value			
		DF	≤ 1.5 times the initial limit			
		LC	≤ The initial limit			
Damp heat (Steady State)	60℃,90 to 95%RH,500h, No-applied voltage	△C/C	Within+50%,–20% of the initial value			
		DF	≤ 1.5 times the initial limit			
		LC	≤ 3 times the initial limit			
Surge	105℃, 1,000 times, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value			
		DF	≤ The initial limit			
		LC	≤ 3 times the initial limit			

Dimensions



(unit: mm)

Size code	L±0.3	W±0.2	H±0.1	S1/S2 ±0.2	S3±0.1	S4±0.2	W1±0.1
D12T	7.3	4.3	1.1	1.1	1.1	2.3	2.8
D15T	7.3	4.3	1.4	1.1	1.1	2.3	2.8
D2T	7.3	4.3	1.8	1.1	1.1	2.3	2.8

Size List

RV : Rated voltage

μF \ RV	2.0	2.5	4.0	6.3
100				D12T
150			D12T	D15T
220	D12T,D2T	D15T,D2T	D15T	
330	D2T	D15T,D2T		
470	D2T	D2T		
560	D2T			

TPL·TPLF Series Characteristics List

(TPL)

Size code	SANYO Part number	Rated Voltage (V)	Rated Temperature (°C)	Rated Capacitance (μF)	Category Voltage (V)	Category Temperature (°C)	DF (%max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20°C	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow Temp. ≤ 260°C	MSL Reflow Temp. ≤ 250°C
D12T	6TPL100MD※2	6.3	105	100	6.3	105	10.0	126.0	25	1400	3	2a
	4TPL150MD※2	4.0		150	4.0			120.0	25	1400		
	2TPL220MD※2	2.0		220	2.0			88.0	25	1400		
D15T	6TPL150MU※2	6.3	105	150	6.3	105	10.0	189.0	25	1800	3	2a
	4TPL220MKU※2	4.0		220	4.0			176.0	20	2000		
	2R5TPL330MFU※2	2.5		330	2.5			165.0	15	2400		
	2R5TPL220MIU※2	2.5		220	2.5			110.0	18	2100		
D2T	2R5TPL470MC	2.5	105	470	2.5	105	10.0	117.5	12	3400	3	2a
	2R5TPL470M9								9	3900		
	2R5TPL470M8							235.0	8	4100		
	2R5TPL470M7※2								7	4400		
	2R5TPL330MC	2.5	105	330	2.5	105	10.0	82.5	12	3400		
	2R5TPL330M9								9	3900		
	2R5TPL330M8							165.0	8	4100		
	2R5TPL330M7※2								7	4400		
	2R5TPL220MC※2	2.5	105	220	2.5	105	10.0	55.0	12	3400		

※1 100k to 500kHz,45 ℃ ※2 Under development

(TPLF)

Size code	SANYO Part number	Rated Voltage (V)	Rated Temperature (°C)	Rated Capacitance (μF)	Category Voltage (V)	Category Temperature (°C)	DF (%max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20°C	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow Temp. ≤ 260°C	MSL Reflow Temp. ≤ 250°C
D2T	2TPLF560M6※2	2.0	105	560	2.0	105	10.0	224.0	6	4700	3	2a
	2TPLF560M5※2								5	5200		
	2TPLF470M7※2	2.0	105	470	2.0	105	10.0	188.0	7	4400		
	2TPLF470M6※2								6	4700		
	2TPLF470M5※2								5	5200		
	2TPLF330M7	2.0	105	330	2.0	105	10.0	132.0	7	4400		
	2TPLF330M6								6	4700		
	2TPLF330M5※2								5	5200		
	2TPLF220M7※2	2.0	105	220	2.0	105	10.0	88.0	7	4400		
	2TPLF220M6※2								6	4700		

Please refer to page 141 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45 ℃
※2 Under development

POSCAP SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

TPF Series

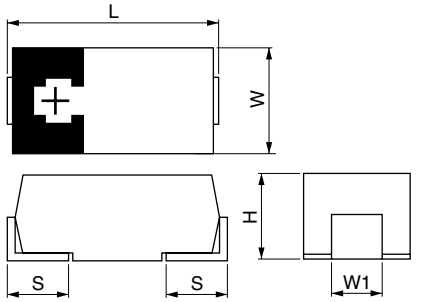
Low ESR · High Capacitance Products

TPF series has low ESR and high capacitance at standard form.

Specifications

Items	Condition		Specifications				
Rated voltage (V)	—		2.0	2.5	4.0	6.3	10
Surge voltage (V)	—		2.6	3.2	5.0	8.0	13
Category temperature range (℃)	—		−55 to +105				
Capacitance tolerance (%)	120Hz/20℃		M : ±20				
Rated capacitance range (μF)	120Hz/20℃		150 to 680				
Dissipation Factor (DF)	120Hz/20℃		Please see the attached characteristics list				
Leakage current	Rated voltage applied, after 5 minutes		Please see the attached characteristics list				
Equivalent series resistance (ESR)	100kHz/20℃		Please see the attached characteristics list				
Characteristics of impedance ratio at high temp. and low temp.	100kHz/+20℃	−55℃ Z/Z20℃	0.6 to 2.0				
		+105℃ Z/Z20℃	0.6 to 2.0				
Endurance	105℃, 2,000h, rated voltage applied	△C/C	Within±20% of the initial value				
		DF	≤ 1.5 times the initial limit				
		LC	≤ The initial limit				
Damp heat (Steady State)	60℃,90 to 95%RH,500h, No-applied voltage	△C/C	Within+50%,-20% of the initial value(D2E size)				
			Within+40%, –20% of the initial value (Except for the above model)				
		DF	≤ 1.5 times the initial limit				
		LC	≤ 3 times the initial limit				
Surge	105℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value				
		DF	≤ The initial limit				
		LC	≤ 3 times the initial limit				

Dimensions



(unit: mm)

Size code	L±0.3	W±0.2	H±0.2※1	S±0.2	W1±0.1
D3L	7.3	4.3	2.8	1.3	2.4
D2E	7.3	4.3	1.8	1.3	2.4

※1 ±0.1:D2E

Size List

RV : Rated voltage

μF \ RV	2.0	2.5	4.0	6.3	10.0
150					D3L
220	D2E			D3L	
330	D2E	D3L	D3L	D3L	
470	D2E	D3L	D3L		
680		D3L			

TPF Series Characteristics List

Size code	SANYO Part number	Rated Voltage (V)	Rated Temperature (°C)	Rated Capacitance (μF)	Category Voltage (V)	Category Temperature (°C)	DF (%max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20°C	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow Temp. ≤ 260°C	MSL Reflow Temp. ≤ 250°C
D3L	10TPF150ML	10	105	150	10	105	10.0	150.0	15	3600	※2	2a
	6TPF330M9L	6.3	105	330	6.3	105	10.0	207.9	9	3900	3	
	6TPF220ML	6.3	105	220	6.3	105	10.0	138.6	12	4000		
	4TPF470ML	4.0	105	470	4.0	105	10.0	188.0	10	4400		
	4TPF330ML	4.0	105	330	4.0	105	10.0	132.0	12	4000		
	2R5TPF680ML	2.5	105	680	2.5	105	10.0	170.0	10	4400		
	2R5TPF680M7L	2.5	105	680	2.5	105	10.0	170.0	7	4400		
	2R5TPF680M6L	2.5	105	680	2.5	105	10.0	170.0	6	4400		
	2R5TPF470ML	2.5	105	470	2.5	105	10.0	117.5	10	4400		
	2R5TPF470M7L	2.5	105	470	2.5	105	10.0	117.5	7	4400		
	2R5TPF470M6L	2.5	105	470	2.5	105	10.0	117.5	6	4400		
	2R5TPF330M7L	2.5	105	330	2.5	105	10.0	82.5	7	4400		
D2E	2TPF470M6※3	2.0	105	470	2.0	105	10.0	188.0	6	4400	※2	
	2TPF330M6	2.0	105	330	2.0	105	10.0	132.0	6	4400		
	2TPF220M6	2.0	105	220	2.0	105	10.0	88.0	6	4400		

Please refer to page 141 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45°C ※2 Under evaluation
※3 Under development

POSCAP SANYO

Conductive Polymer Type / Surface Mount Type **RoHS compliance**

TPG Series

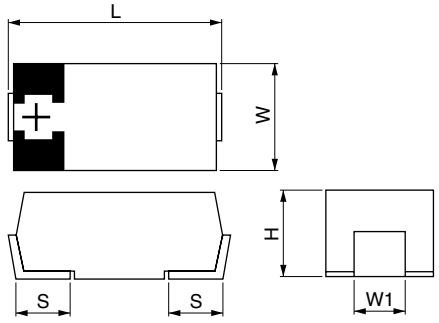
Small Size · High Capacitance Products

TPG series is high capacitance model of the small size · low profile product.
Suitable for the miniaturization design of the electronics device.

Specifications

Items	Condition		Specifications					
Rated voltage (V)	—		2.5	4.0	6.3	8.0	10	12.5
Surge voltage (V)	—		3.2	5.0	8.0	10	13	16
Category temperature range (℃)	—		−55 to +105					
Capacitance tolerance (%)	120Hz/20℃		M : ±20					
Rated capacitance range (μF)	120Hz/20℃		30 to 220					
Dissipation Factor (DF)	120Hz/20℃		Please see the attached characteristics list					
Leakage current	Rated voltage applied, after 5 minutes		Please see the attached characteristics list					
Equivalent series resistance (ESR)	100kHz/20℃		Please see the attached characteristics list					
Characteristics of impedance ratio at high temp. and low temp.	100kHz/+20℃	−55℃ Z/Z20℃	0.6 to 2.0					
		+105℃ Z/Z20℃	0.6 to 2.0					
Endurance	85℃, 1,000h, rated voltage applied or 105℃,1,000h, category voltage applied	△C/C	Within±20% of the initial value					
		DF	≤ 1.5 times the initial limit					
		LC	≤ The initial limit					
Damp heat (Steady State)	60℃,90 to 95%RH,500h, No-applied voltage	△C/C	Within+40%,−20% of the initial value					
		DF	≤ 1.5 times the initial limit					
		LC	≤ 3 times the initial limit					
Surge	85℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value					
		DF	≤ The initial limit					
		LC	≤ 3 times the initial limit					

Dimensions



(unit: mm)

Size code	L +0.3 −0.1	W +0.3 −0.1	H±0.1	S±0.2	W1±0.1
B1G	3.5	2.8	1.1	0.8	2.2
B15G	3.5	2.8	1.4	0.8	2.2

Size List

RV : Rated voltage

μF \ RV	2.5	4.0	6.3	8.0	10	12.5
33					B1G	B1G
47				B1G	B1G	
68			B1G			
100			B1G			
150		B1G	B15G			
220	B1G	B15G				

TPG Series Characteristics List

Size code	SANYO Part number	Rated Voltage (V)	Rated Temperature (°C)	Rated Capacitance (μF)	Category Voltage (V)	Category Temperature (°C)	DF (%max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20°C	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow Temp. ≤ 260°C	MSL Reflow Temp. ≤ 250°C
B15G	6TPG150M	6.3	85	150	5.0	105	10.0	94.5	70	1000		
	4TPG220M	4.0	85	220	3.2	105	10.0	88.0	70	1000		
B1G	12TPG33M	12.5	85	33	10	105	10.0	41.3	70	1000		
	10TPG47M	10	85	47	8.0	105	10.0	47.0	70	1000		
	10TPG33M	10	85	33	8.0	105	10.0	33.0	70	1000		
	8TPG47M	8.0	85	47	6.4	105	10.0	37.6	70	1000	3	3
	6TPG100M	6.3	85	100	5.0	105	10.0	63.0	70	1000		
	6TPG100MG	6.3	85	100	5.0	105	10.0	63.0	55	1100		
	6TPG68M	6.3	85	68	5.0	105	10.0	42.8	70	1000		
	4TPG150M	4.0	85	150	3.2	105	10.0	60.0	70	1000		
	2R5TPG220M	2.5	85	220	2.0	105	10.0	55.0	70	1000		

Please refer to page 141 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45°C

POSCAP SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

TPE Series

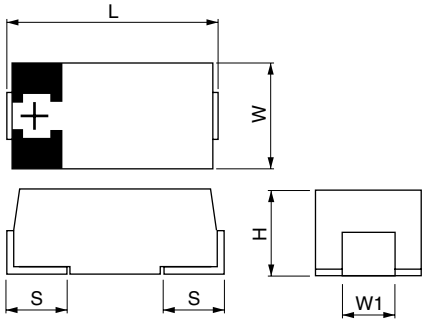
Low ESR Products (C3,C2,B2 Size)

This products is the miniaturized version of TPE series.

Specifications

Items	Condition			Specifications					
Rated voltage (V)	—			2.0	2.5	4.0	6.3	8.0	10
Surge voltage (V)	—			2.6	3.2	5.0	8.0	10	13
Category temperature range (℃)	—			−55 to +105					
Capacitance tolerance (%)	120Hz/20℃			M : ±20					
Rated capacitance range (μF)	120Hz/20℃			47 to 330					
Dissipation Factor (DF)	120Hz/20℃			Please see the attached characteristics list					
Leakage current	Rated voltage applied, after 5 minutes			Please see the attached characteristics list					
Equivalent series resistance (ESR)	100kHz/20℃			Please see the attached characteristics list					
Characteristics of impedance ratio at high temp. and low temp.	100kHz/+20℃	−55℃	Z/Z20℃	0.6 to 2.0					
		+105℃	Z/Z20℃	0.6 to 2.0					
Endurance	105℃, 2,000h,(B2size:1,000h) rated voltage applied ★Rated temp. 85℃ products: 85℃,1,000h, rated voltage applied	△C/C		Within±20% of the initial value					
		DF		≤ 1.5 times the initial limit					
		LC		≤ The initial limit					
Damp heat (Steady State)	60℃,90 to 95%RH,500h, No-applied voltage	△C/C		Within+50%, −20%（2R5TPE220MDGB（MAZB,MAPB）, 2R5TPE330MAZB,2TPE330MIB（MFB,MAFB,MAFGB,MADGB）, 2R5TPE330MFC2（CC2、9C2））					
				Within+40%, −20% of the initial value (Except for the above model)					
		DF		≤ 1.5 times the initial limit					
		LC		≤ 3 times the initial limit					
Surge	105℃,1,000 times,1kΩ discharge resistance,surge voltage applied ★Rated temp 85℃ products: 85℃,1,000 times	△C/C		Within±5% of the initial value					
		DF		≤ The initial limit					
		LC		≤ 3 times the initial limit					

Dimensions



(unit: mm)

Size code	L ±0.2	W ±0.2	H ±0.1※1	S ±0.2	W1 ±0.1
B2	3.5	2.8	1.9	0.8	2.2
C2	6.0	3.2	1.8	1.3	1.8
C3	6.0	3.2	2.5	1.3	1.8

※1 ±0.2:C3

Size List

RV : Rated voltage

μF \ RV	2.0	2.5	4.0	6.3	8.0	10
47						B2
100			B2	B2	C2	
120				B2		
150		B2	B2	B2,C2		C3
180						C3
220		B2	B2,C2	C3		
330	B2	B2,C2				

TPE Series Characteristics List

Size code	SANYO Part number	Rated Voltage (V)	Rated Temperature (°C)	Rated Capacitance (μF)	Category Voltage (V)	Category Temperature (°C)	DF (%max)	LC (μA) max/5min.	ESR (mΩ max) 100kHz/20℃	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow Temp. ≤ 260°C	MSL Reflow Temp. ≤ 250°C
B2	10TPE47MAZB	10	85	47	8.0	105	8.0	47.0	35	1400	3	3
	6TPE150MAZB	6.3	85	150	5.0	105	8.0	94.5	35	1400		
	6TPE120MAZB	6.3	85	120	5.0	105	8.0	75.6	35	1400		
	6TPE100MZB	6.3	105	100	6.3	105	8.0	63.0	35	1400		
	6TPE100MPB								25	1600		
	6TPE100MAZB	6.3	85	100	5.0	105	8.0	63.0	35	1400		
	4TPE220MAZB	4.0	85	220	3.2	105	8.0	88.0	35	1400		
	4TPE150MAZB	4.0	85	150	3.2	105	8.0	60.0	35	1400		
	4TPE150MAUB								30	1500		
	4TPE100MZB	4.0	105	100	4.0	105	8.0	40.0	35	1400		
	2R5TPE330MAZB	2.5	85	330	2.0	105	8.0	82.5	35	1400		
	2R5TPE220MZB	2.5	105	220	2.5	105	8.0	55.0	35	1400		
	2R5TPE220MPB								25	1600		
	2R5TPE220MLB								21	1700		
	2R5TPE220MIB	2.5	105	220	2.5	105	8.0	110.0	18	1800		
	2R5TPE220MFGB								15/300k	1800		
	2R5TPE220MDGB	2.5	105	220	2.5	105	8.0	110.0	13/300k	2000		
	2R5TPE220MAZB	2.5	85	220	2.0	105	8.0	55.0	35	1400		
	2R5TPE220MAPB								25	1600		
	2R5TPE220MAFB	2.5	85	220	2.0	105	8.0	110.0	15	2000		
	2R5TPE150MZB	2.5	105	150	2.5	105	8.0	37.5	35	1400		
	2TPE330MIB	2.0	105	330	2.0	105	8.0	132.0	18	1800		
	2TPE330MFB								15	2000		
	2TPE330MAFGB	2.0	85	330	1.8	105	8.0	132.0	15/300k	1800		
	2TPE330MAFB								15	2000		
	2TPE330MADGB								13/300k	2000		
C2	8TPE100MPC2	8.0	105	100	8.0	105	8.0	80.0	25	2200		
	6TPE150MPC2	6.3	105	150	6.3	105	8.0	94.5	25	2200		
	6TPE150MIC2								18	2600		
	4TPE220MPC2	4.0	105	220	4.0	105	8.0	88.0	25	2200		
	4TPE220MIC2								18	2600		
	4TPE220MFC2								15	2900		
	2R5TPE330MIC2	2.5	105	330	2.5	105	8.0	82.5	18	2600		
	2R5TPE330MFC2								15	2900		
	2R5TPE330MCC2								12	3300		
	2R5TPE330M9C2								9	3700		
C3	10TPE180MGC	10	105	180	10	105	10.0	180	55	1500	—	
	10TPE150MGC	10	105	150	10	105	10.0	150.0	55	1500	—	
	6TPE220MPC	6.3	105	220	6.3	105	8.0	138.6	25	2400	3	
	6TPE220MIC	6.3	105	220	6.3	105	8.0	138.6	18	2800		

Please refer to page 141 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45°C

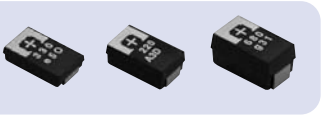
POSCAP SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

TPE Series

Low ESR Products (D2E, D3L, D4 Size)

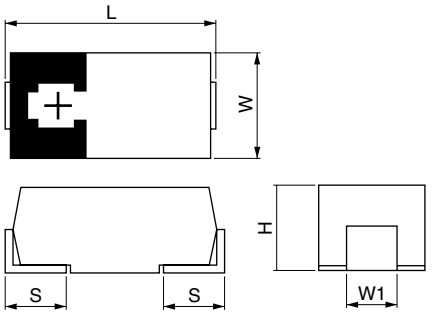


TPE series has low ESR and can aid in the miniaturization of many products.

Specifications

Items	Condition			Specifications			
Rated voltage (V)	—			2.5	4.0	6.3	10
Surge voltage (V)	—			3.2	5.0	8.0	13
Category temperature range (℃)	—			−55 to +105			
Capacitance tolerance (%)	120Hz/20℃			M : ±20			
Rated capacitance range (μF)	120Hz/20℃			68 to 1,500			
Dissipation Factor (DF)	120Hz/20℃			Please see the attached characteristics list			
Leakage current	Rated voltage applied, after 5 minutes			Please see the attached characteristics list			
Equivalent series resistance (ESR)	100kHz/20℃			Please see the attached characteristics list			
Characteristics of impedance ratio at high temp. and low temp.	100kHz/+20℃	−55℃	Z/Z20℃	0.6 to 2.0			
		+105℃	Z/Z20℃	0.6 to 2.0			
Endurance	105℃, 2,000h, rated voltage applied ※ Rated temp. 85℃ products: 85℃,1,000h, rated voltage applied	△C/C		Within±20% of the initial value			
		DF		≤ 1.5 times the initial limit			
		LC		≤ The initial limit			
Damp heat (Steady State)	60℃,90 to 95%RH,500h, No-applied voltage	△C/C		Within+50%, –20% of the initial value (2R5TPE470M (Ⅰ,F,C,9,7), 2R5TPE330M (Ⅰ,F,C,9,7),2R5TPE220M (Ⅰ,F,C,9,7) , 2R5TPE1000M (Ⅰ,F) ,2R5TPE1500M (F,C)			
				Within+40%, –20% of the initial value (Except for the above model)			
		DF		≤ 1.5 times the initial limit			
		LC		≤ 3 times the initial limit			
Surge	105℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied ※ 6TPE330MAP,16TPE220MAP:85℃	△C/C		Within±5% of the initial value			
		DF		≤ The initial limit			
		LC		≤ 3 times the initial limit			

Dimensions



(unit: mm)

Size code	L ±0.3	W ±0.2	H ±0.2※1	S ±0.2	W1 ±0.1
D2E	7.3	4.3	1.8	1.3	2.4
D3L	7.3	4.3	2.8	1.3	2.4
D4	7.3	4.3	3.8	1.3	2.4

※1 ±0.1:D2E

Size List

RV : Rated voltage

RV / μF	2.5	4.0	6.3	10
68				D2E
100			D2E	
150		D2E	D2E	
220	D2E	D2E	D2E	D3L
330	D2E	D2E	D2E,D3L	D4
470	D2E	D3L	D4	
680	D3L	D4	D4	
1000	D4			
1500	D4			

TPE Series Characteristics List

Size code	SANYO Part number	Rated Voltage (V)	Rated Temperature (°C)	Rated Capacitance (μF)	Category Voltage (V)	Category Temperature (°C)	DF (%max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20°C	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow Temp. ≤ 260°C	MSL Reflow Temp. ≤ 250°C
D2E	10TPE68M	10	105	68	10	105	10.0	68.0	25	2400	3	2a
	6TPE330MAP	6.3	85	330	5.0	105	10.0	207.9	25	2400		
	6TPE220MAP	6.3	85	220	5.0	105	10.0	138.6	25	2400		
	6TPE220M	6.3	105	220	6.3	105	10.0	138.6	25	2400		
	6TPE220MI								18	2800		
	6TPE150M	6.3	105	150	6.3	105	10.0	94.5	25	2400		
	6TPE150MI								18	2800		
	6TPE100M	6.3	105	100	6.3	105	10.0	63.0	25	2400		
	6TPE100MI								18	2800		
	4TPE330M	4.0	105	330	4.0	105	10.0	132.0	25	2400		
	4TPE330MI								18	2800		
	4TPE220M	4.0	105	220	4.0	105	10.0	88.0	25	2400		
	4TPE220MI								18	2800		
	4TPE220MF								15	3100		
	4TPE150M	4.0	105	150	4.0	105	10.0	60.0	25	2400		
	4TPE150MI								18	2800		
	2R5TPE470M	2.5	105	470	2.5	105	10.0	117.5	25	2400		
	2R5TPE470MI								18	2800		
	2R5TPE470MF								15	3100		
	2R5TPE470MC								12	3500		
	2R5TPE470M9								9	3900		
	2R5TPE470M7	2.5	105	470	2.5	105	10.0	235.0	7	4400		
	2R5TPE330M	2.5	105	330	2.5	105	10.0	82.5	25	2400		
	2R5TPE330MI								18	2800		
	2R5TPE330MF								15	3100		
	2R5TPE330MC								12	3500		
	2R5TPE330M9								9	3900		
	2R5TPE330M7	2.5	105	330	2.5	105	10.0	165.0	7	4400		
	2R5TPE220M	2.5	105	220	2.5	105	10.0	55.0	25	2400		
	2R5TPE220MI								18	2800		
	2R5TPE220MF								15	3100		
	2R5TPE220MC								12	3500		
	2R5TPE220M9								9	3900		
	2R5TPE220M7	2.5	105	220	2.5	105	10.0	110.0	7	4400		
D3L	10TPE220ML	10	105	220	10	105	10.0	220.0	25	2400	※2	
	6TPE330ML	6.3	105	330	6.3	105	10.0	207.9	25	2400	3	
	6TPE330MIL								18	2800		
	6TPE330MFL								15	3100		
	4TPE470ML	4.0	105	470	4.0	105	10.0	188.0	25	2400		
	4TPE470MIL								18	2800		
	4TPE470MFL								15	3100		
	4TPE470MCL								12	3500		
	2R5TPE680ML	2.5	105	680	2.5	105	10.0	170.0	25	2400		
	2R5TPE680MIL								18	2800		
	2R5TPE680MFL								15	3100		
	2R5TPE680MCL								12	3500		
D4	10TPE330M	10	105	330	10	105	10.0	330.0	25	3000	※2	
	6TPE680M	6.3	105	680	6.3	105	15.0	428.4	25	3000	3	
	6TPE680MI								18	3500		
	6TPE470M	6.3	105	470	6.3	105	15.0	296.1	25	3000		
	6TPE470MI								18	3500		
	4TPE680M	4.0	105	680	4.0	105	15.0	272.0	25	3000		
	4TPE680MI								18	3500		
	4TPE680MF								15	3900		
	2R5TPE1000M	2.5	105	1000	2.5	105	15.0	250.0	25	3000		
	2R5TPE1000MI								18	3500		
	2R5TPE1000MF								15	3900		
	2R5TPE1500MF	2.5	105	1500	2.5	105	15.0	375.0	15	3900	※2	
	2R5TPE1500MC								12	4400		

Please refer to page 141 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45°C ※2 Under evaluation

POSCAP SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

TA Series

High Reliability Products (For The Car Electronics)

TA series are high reliability products that the heatresistance and moisture resistance are improved.

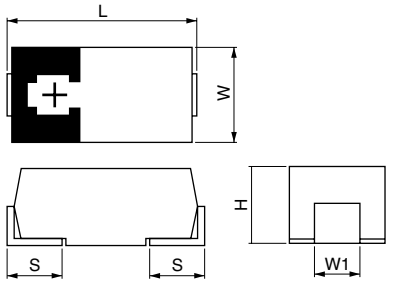
*Suitable for the industrial equipment or car electronics (e.g. Car navigation system).

Specifications

Items	Condition		Specifications			
Rated voltage (V)	—		2.5	4.0	6.3	10
Surge voltage (V)	—		3.2	5.0	8.0	13
Category temperature range (℃)	—		−55 to +105			
Capacitance tolerance (%)	120Hz/20℃		M : ±20			
Rated capacitance range (μF)	120Hz/20℃		47 to 680			
Dissipation Factor (DF)	120Hz/20℃		Please see the attached characteristics list			
Leakage current	Rated voltage applied, after 5 minutes		Please see the attached characteristics list			
Equivalent series resistance (ESR)	100kHz/20℃		Please see the attached characteristics list			
Characteristics of impedance ratio at high temp. and low temp.	100kHz/+20℃	−55℃ Z/Z20℃	0.6 to 2.0			
		+105℃ Z/Z20℃	0.6 to 2.0			
Endurance	105℃,2,000h,(B2size:1,000h) rated voltage applied	△C/C	Within±20% of the initial value			
		DF	≤ 1.5 times the initial limit			
		LC	≤ The initial limit			
Damp heat(Load)	85℃,85%RH,500h, rated voltage applied	△C/C	Within+40%,−20% of the initial value ※1			
		DF	≤ 1.5 times the initial limit			
		LC	≤ The initial limit			
Damp heat(Steady state)	60℃,90 to 95%RH,500h, No-applied voltage	△C/C	Within+40%,−20% of the initial value ※1			
		DF	≤ 1.5 times the initial limit			
		LC	≤ 3 times the initial limit			
Surge	105℃,1,000 cycles, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value			
		DF	≤ The initial limit			
		LC	≤ 3 times the initial limit			

※1 Within +50%, −20% of the initial value(2R5TAE470M(F), 2R5TAE330M(F,Z), 2R5TAE220M(F))

Dimensions



(unit: mm)

Size code	L±0.3※2	W±0.2	H±0.2※1	S±0.2	W1±0.1
B2	3.5	2.8	1.9	0.8	2.2
D2E	7.3	4.3	1.8	1.3	2.4
D3L	7.3	4.3	2.8	1.3	2.4

※1 ±0.1:D2E,B2 ※2 ±0.2:B2

Size List

RV : Rated voltage

μF \ RV	2.5	4	6.3	10
47			B2	B2
68			B2	D2E
100		B2		
150			D2E	
220	D2E	D2E	D2E	D3L
330	D2E		D3L	
470	D2E	D3L		
680	D3L			

TA Series Characteristics List

Size code	SANYO Part number	Rated Voltage (V)	Rated Temperature (°C)	Rated Capacitance (μF)	Category Voltage (V)	Category Temperature (°C)	DF (%max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20°C	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow Temp. ≤ 260°C	MSL Reflow Temp. ≤ 250°C
B2	10TAB47M	10	105	47	10	105	8.0	47.0	70	1100	3	3
	6TAB68M	6.3	105	68	6.3	105	8.0	42.8	70	1100		
	6TAB47M	6.3	105	47	6.3	105	8.0	29.6	70	1100		
	4TAB100M	4.0	105	100	4.0	105	8.0	40.0	70	1100		
D2E	10TAE68M	10	105	68	10	105	10.0	68	25	2400		
	6TAE220M	6.3	105	220	6.3	105	10.0	138.6	25	2400		
	6TAE220MI								18	2800		
	6TAE150M	6.3	105	150	6.3	105	10.0	94.5	25	2400		
	4TAE220M	4.0	105	220	4.0	105	10.0	88	25	2400		
	4TAE220MI								18	2800		
	2R5TAE470M	2.5	105	470	2.5	105	10.0	117.5	25	2400		
	2R5TAE470MF								15	3100		
	2R5TAE330M	2.5	105	330	2.5	105	10.0	82.5	25	2400		
	2R5TAE330MI								18	2800		
	2R5TAE330MF								15	3100		
	2R5TAE220M	2.5	105	220	2.5	105	10.0	55	25	2400		
	2R5TAE220MF								15	3100		
D3L	10TAE220ML	10	105	220	10	105	10.0	220.0	25	2400		
	6TAE330ML	6.3	105	330	6.3	105	10.0	207.9	25	2400		
	4TAE470ML	4.0	105	470	4.0	105	10.0	188	25	2400		
	4TAE470MIL								18	2800		
	2R5TAE680ML	2.5	105	680	2.5	105	10.0	170	25	2400		
	2R5TAE680MFL								15	3100		

Please refer to page 141 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45°C

Conductive Polymer Type / Surface Mount Type

RoHS compliance

TR Series

High Moisture Resistance
Custom-made Products

TR series are improved model of the moisture resistance more than standard products.
Suitable for the industrial equipment.

Specifications

Items	Condition		Specifications						
Rated voltage (V)	—		2.0	2.5	4.0	6.3	8.0	10	12.5
Surge voltage (V)	—		2.6	3.2	5.0	8.0	10	13	16
Category temperature range (℃)	—		−55 to +105						
Capacitance tolerance (%)	120Hz/20℃		M : ±20						
Rated capacitance range (μF)	120Hz/20℃		5.6 to 1500						
Dissipation Factor (DF)	120Hz/20℃		Please ask our sales office						
Leakage current	Rated voltage applied, after 5 minutes		Please ask our sales office						
Equivalent series resistance (ESR)	100kHz/20℃		Please ask our sales office						
Characteristics of impedance ratio at high temp. and low temp.	100kHz/+20℃	−55℃ Z/Z20℃	0.6 to 2.0						
		+105℃ Z/Z20℃	0.6 to 2.0						
Endurance	105℃, 2,000h,(B2size:1,000h) rated voltage applied ★Rated temp. 85℃ products: 85℃,1,000h, rated voltage applied	△C/C	Within±20% of the initial value						
		DF	≤ 1.5 times the initial limit						
		LC	≤ The initial limit						
Damp heat (Load)	85℃,85%RH,500h, rated voltage applied	△C/C	Within+40% or +50%, –20% of the initial value						
		DF	≤ 1.5 times the initial limit						
		LC	≤ The initial limit						
Damp heat (Steady state)	60℃,90 to 95%RH,500h, No-applied voltage	△C/C	Within+40% or +50%, –20% of the initial value						
		DF	≤ 1.5 times the initial limit						
		LC	≤ 3 times the initial limit						
Surge	105℃, 1,000 times,1kΩ discharge resistance,surge voltage applied ※Rated temp. 85℃ products:85℃	△C/C	Within±5% of the initial value						
		DF	≤ The initial limit						
		LC	≤ 3 times the initial limit						

The TR series are highly-reliable products for the industrial equipment that improved the moisture resistance level for the better performance to the TPseries.
This series is the custom-made products, so if you have any interests, please ask our sales office.

POSCAP SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

TPB Series

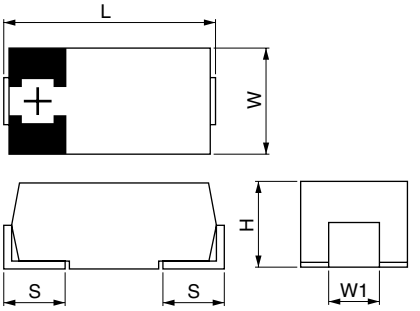
Standard Products (B2 Size)

B2 size is the miniaturized version of TPB series.

Specifications

Items	Condition		Specifications				
Rated voltage (V)	—		2.5	4.0	6.3	8.0	10
Surge voltage (V)	—		3.2	5.0	8.0	10	13
Category temperature range (℃)	—		−55 to +105				
Capacitance tolerance (%)	120Hz/20℃		M : ±20				
Rated capacitance range (μF)	120Hz/20℃		33 to 220				
Dissipation Factor (DF)	120Hz/20℃		Please see the attached characteristics list				
Leakage current	Rated voltage applied, after 5 minutes		Please see the attached characteristics list				
Equivalent series resistance (ESR)	100kHz/+20℃		Please see the attached characteristics list				
Characteristics of impedance ratio at high temp. and low temp.	100kHz/20℃	−55℃ Z/Z20℃	0.6 to 2.0				
		+105℃ Z/Z20℃	0.6 to 2.0				
Endurance	105℃, 1,000h, Rated voltage applied ※Rated temp. 85℃ products: 85℃, 1,000h, rated voltage applied	△C/C	Within±20% of the initial value				
		DF	≤ 1.5 times the initial limit				
		LC	≤ The initial limit				
Damp heat (Steady State)	60℃,90 to 95%RH,500h, No-applied voltage	△C/C	Within+40%,–20% of the initial value				
		DF	≤ 1.5 times the initial limit				
		LC	≤ 3 times the initial limit				
Surge	105℃,1,000 cycles, 1kΩdischarge resistance, surge voltage applied ※6TPB100MA, 4TPB150MA,2R5TPB220MA:85℃	△C/C	Within±5% of the initial value				
		DF	≤ The initial limit				
		LC	≤ 3 times the initial limit				

Dimensions



(unit: mm)

Size code	L ±0.2	W ±0.2	H ±0.1	S ±0.2	W ±0.1
B2	3.5	2.8	1.9	0.8	2.2

Size List

RV : Rated voltage

μF \ RV	2.5	4.0	6.3	8.0	10
33				B2	B2
47			B2	B2	B2
68		B2	B2		
100	B2	B2	B2		
150		B2			
220	B2				

TPB Series Characteristics List

Size code	SANYO Part number	Rated Voltage (V)	Rated Temperature (°C)	Rated Capacitance (μF)	Category Voltage (V)	Category Temperature (°C)	DF (%max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20°C	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow Temp. ≤ 260°C	MSL Reflow Temp. ≤ 250°C
B2	10TPB47M	10	105	47	10	105	8.0	47.0	70	1100	3	3
	10TPB33M	10	105	33	10	105	8.0	33.0	70	1100		
	8TPB47M	8.0	105	47	8.0	105	8.0	37.6	70	1100		
	8TPB33M	8.0	105	33	8.0	105	8.0	26.4	70	1100		
	6TPB100MA	6.3	85	100	5.0	105	8.0	63.0	55	1200		
	6TPB100MAV	6.3	85	100	5.0	105	8.0	63.0	45	1400		
	6TPB68M	6.3	105	68	6.3	105	8.0	42.8	70	1100		
	6TPB47M	6.3	105	47	6.3	105	8.0	29.6	70	1100		
	4TPB150MA	4.0	85	150	3.2	105	8.0	60.0	70	1100		
	4TPB100M	4.0	105	100	4.0	105	8.0	40.0	70	1100		
	4TPB100MV	4.0	105	100	4.0	105	8.0	40.0	45	1300		
	4TPB68M	4.0	105	68	4.0	105	8.0	27.2	70	1100		
	2R5TPB220MA	2.5	85	220	2.0	105	8.0	55.0	55	1200		
	2R5TPB100M	2.5	105	100	2.5	105	8.0	25.0	70	1100		

Please refer to page 141 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45°C

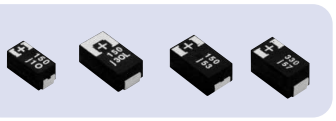
POSCAP SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

TPB Series

Standard Products

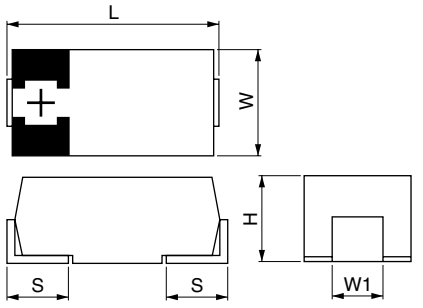


TPB series are the standard products corresponding to the diversification of the needs.

Specifications

Items	Condition		Specifications				
Rated voltage (V)	—		2.5	4.0	6.3	8.0	10
Surge voltage (V)	—		3.2	5.0	8.0	10	13
Category temperature range (℃)	—		−55 to +105				
Capacitance tolerance (%)	120Hz/20℃		M : ±20				
Rated capacitance range (μF)	120Hz/20℃		47 to 1,000				
Dissipation Factor (DF)	120Hz/20℃		Please see the attached characteristics list				
Leakage current	Rated voltage applied, after 5 minutes		Please see the attached characteristics list				
Equivalent series resistance (ESR)	100kHz/+20℃		Please see the attached characteristics list				
Characteristics of impedance ratio at high temp. and low temp.	100kHz/20℃	−55℃ Z/Z20℃	0.6 to 2.0				
		+105℃ Z/Z20℃	0.6 to 2.0				
Endurance	105℃, 2,000h, Rated voltage applied	△C/C	Within±20% of the initial value				
		DF	≤ 1.5 times the initial limit				
		LC	≤ The initial limit				
Damp heat (Steady State)	60℃,90 to 95%RH,500h, No-applied voltage	△C/C	Within+50%,–20% of the initial value (2R5TPB1000M)				
			Within+40%, –20% of the initial value (Except for the above model)				
		DF	≤ 1.5 times the initial limit				
		LC	≤ 3 times the initial limit				
Surge	105℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value				
		DF	≤ The initial limit				
		LC	≤ 3 times the initial limit				

Dimensions



(unit: mm)

Size code	L ±0.2※1	W ±0.2	H ±0.2	S ±0.2	W1 ±0.1
C	6.0	3.2	2.8	1.3	1.8
D3L	7.3	4.3	2.8	1.3	2.4
D3	7.3	4.3	3.1	1.3	2.4
D4	7.3	4.3	3.8	1.3	2.4

※1 ±0.3:D3L,D4

Size List

RV : Rated voltage

μF \ RV	2.5	4.0	6.3	8.0	10.0
47					C
68					C
82				C	
100			C		D3,D3L
150		C	C,D3,D3L		D3L
220	C	C,D3,D3L	D3L		C,D3L,D4
330	D3,D3L	D3L	D3L,D4		D4
470	D3L	D3L,D4	D4		
680	D3L,D4	D4			
1000	D4				

TPB Series Characteristics List

Size code	SANYO Part number	Rated Voltage (V)	Rated Temperature (°C)	Rated Capacitance (μF)	Category Voltage (V)	Category Temperature (°C)	DF (%max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20°C	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow Temp. ≤ 260°C	MSL Reflow Temp. ≤ 250°C
C	10TPB220MC	10	105	220	10	105	10.0	220	55	1500	※2	3
	10TPB68MC	10	105	68	10.0	105	8.0	68.0	55	1500	3	
	10TPB47MC	10	105	47	10.0	105	8.0	47.0	55	1500		
	8TPB82MC	8.0	105	82	8.0	105	8.0	65.6	45	1700		
	6TPB150MC	6.3	105	150	6.3	105	8.0	94.5	45	1700		
	6TPB100MC	6.3	105	100	6.3	105	8.0	63.0	45	1700		
	4TPB220MC	4.0	105	220	4.0	105	8.0	88.0	45	1700		
	4TPB150MC	4.0	105	150	4.0	105	8.0	60.0	45	1700		
	2R5TPB220MC	2.5	105	220	2.5	105	8.0	55.0	45	1700		
D3L	10TPB220ML	10	105	220	10	105	10.0	220.0	40	2000	※2	2a
	10TPB150ML	10	105	150	10	105	10.0	150.0	40	2000	3	
	10TPB100ML	10	105	100	10	105	8.0	100.0	55	1900		
	6TPB330ML	6.3	105	330	6.3	105	10.0	207.9	40	2000		
	6TPB220ML	6.3	105	220	6.3	105	10.0	138.6	40	2000		
	6TPB150ML	6.3	105	150	6.3	105	8.0	94.5	55	1900		
	4TPB470ML	4.0	105	470	4.0	105	10.0	188.0	40	2000		
	4TPB330ML	4.0	105	330	4.0	105	10.0	132.0	40	2000		
	4TPB220ML	4.0	105	220	4.0	105	8.0	88.0	55	1900		
	2R5TPB680ML	2.5	105	680	2.5	105	10.0	170.0	40	2000		
	2R5TPB470ML	2.5	105	470	2.5	105	10.0	117.5	40	2000		
	2R5TPB330ML	2.5	105	330	2.5	105	8.0	82.5	55	1900		
D4	10TPB330M	10	105	330	10	105	10.0	330.0	35	3000	※2	
	10TPB220M	10	105	220	10	105	10.0	220.0	40	3000	3	
	6TPB470M	6.3	105	470	6.3	105	15.0	296.1	35	3000		
	6TPB330M	6.3	105	330	6.3	105	10.0	207.9	40	3000		
	4TPB680M	4.0	105	680	4.0	105	15.0	272.0	35	3000		
	4TPB470M	4.0	105	470	4.0	105	10.0	188.0	40	3000		
	2R5TPB1000M	2.5	105	1000	2.5	105	15.0	250.0	30	3000		
	2R5TPB680M	2.5	105	680	2.5	105	10.0	170.0	40	3000		

Please refer to page 141 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45℃
※2 Under evaluation

POSCAP SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

TPC Series

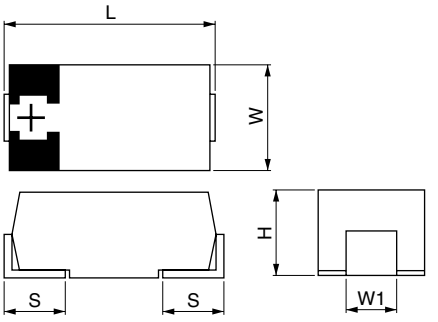
Low Profile Products

TPC series has low profile and low ESR. TPC series aids in the miniaturization of any products.

Specifications

Items	Condition			Specifications				
Rated voltage (V)	—			2.5	4.0	6.3	8.0	10
Surge voltage (V)	—			3.2	5.0	8.0	10	13
Category temperature range (℃)	—			−55 to +105				
Capacitance tolerance (%)	120Hz/20℃			M : ±20				
Rated capacitance range (μF)	120Hz/20℃			33 to 330				
Dissipation Factor (DF)	120Hz/20℃			Please see the attached characteristics list				
Leakage current	Rated voltage applied, after 5 minutes			Please see the attached characteristics list				
Equivalent series resistance (ESR)	100kHz/20℃			Please see the attached characteristics list				
Characteristics of impedance ratio at high temp. and low temp.	100kHz/+20℃	−55℃	Z/Z20℃	0.6 to 2.0				
		+105℃	Z/Z20℃	0.6 to 2.0				
Endurance	105℃,2,000h,rated voltage applied C1 size:1,000h ※ Rated temp. 85℃ products: 85℃,1,000h, rated voltage applied	△C/C		Within±20% of the initial value				
		DF		≤ 1.5 times the initial limit				
		LC		≤ The initial limit				
Damp heat (Steady State)	60℃,90 to 95%RH,500h, No-applied voltage	△C/C		Within+40%,−20% of the initial value				
		DF		≤ 1.5 times the initial limit				
		LC		≤ 3 times the initial limit				
Surge	105℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied ※ 6TPC330MA:85℃	△C/C		Within±5% of the initial value				
		DF		≤ The initial limit				
		LC		≤ 3 times the initial limit				

Dimensions



(unit: mm)

Size code	L ±0.2	W ±0.2	H ±0.1	S ±0.2	W1 ±0.1
C1	6.0	3.2	1.4	1.3	1.8
D2	7.3	4.3	1.9	1.3	2.4

Size List

RV : Rated voltage

μF \ RV	2.5	4.0	6.3	8.0	10
33				C1	
56		C1			
68			C1		D2
82	C1				
100		C1	D2,C1		D2
150		D2	D2	D2	
220	D2	D2			
330	D2		D2		

TPC Series Characteristics List

Size code	SANYO Part number	Rated Voltage (V)	Rated Temperature (°C)	Rated Capacitance (μF)	Category Voltage (V)	Category Temperature (°C)	DF (%max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20°C	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow Temp. ≤ 260°C	MSL Reflow Temp. ≤ 250°C
C1	8TPC33M	8.0	105	33	8.0	105	10.0	26.4	70	1200	3	3
	6TPC100MC	6.3	85	100	5.0	105	10.0	63.0	55	1300		
	6TPC68M	6.3	105	68	6.3	105	10.0	42.8	55	1300		
	4TPC100M	4.0	105	100	4.0	105	10.0	40.0	55	1300		
	4TPC56M	4.0	105	56	4.0	105	10.0	22.4	70	1200		
	2R5TPC82M	2.5	105	82	2.5	105	10.0	20.5	70	1200		
D2	10TPC100M	10	105	100	10	105	10.0	100.0	45	1700	3	2a
	10TPC68M	10	105	68	10	105	10.0	68.0	45	1700		
	8TPC150M	8.0	105	150	8.0	105	10.0	120.0	40	1900		
	6TPC330MA	6.3	85	330	5.0	105	10.0	207.9	40	1900		
	6TPC150M	6.3	105	150	6.3	105	10.0	94.5	40	1900		
	6TPC100M	6.3	105	100	6.3	105	10.0	63.0	45	1700		
	4TPC220M	4.0	105	220	4.0	105	10.0	88.0	40	1900		
	4TPC150M	4.0	105	150	4.0	105	10.0	60.0	45	1700		
	2R5TPC330M	2.5	105	330	2.5	105	10.0	82.5	40	1900		
	2R5TPC220M	2.5	105	220	2.5	105	10.0	55.0	45	1700		

Please refer to page 141 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45°C

POSCAP SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

TPC Series

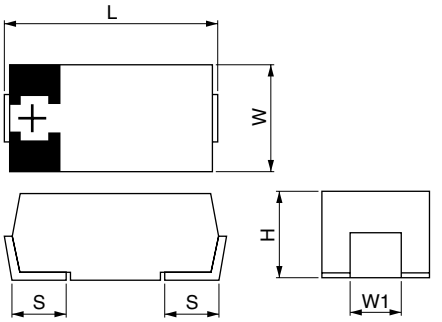
B1 Size

B1 size is miniaturized, low profile version of TPC series.

Specifications

Items	Condition		Specifications					
Rated voltage (V)	—		2.5	4.0	6.3	8.0	10	12.5
Surge voltage (V)	—		3.2	5.0	8.0	10	13	16
Category temperature range (℃)	—		−55 to +105					
Capacitance tolerance (%)	120Hz/20℃		M : ±20					
Rated capacitance range (μF)	120Hz/20℃		10 to 56					
Dissipation Factor (DF)	120Hz/20℃		Please see the attached characteristics list					
Leakage current	Rated voltage applied, after 5 minutes		Please see the attached characteristics list					
Equivalent series resistance (ESR)	100kHz/20℃		Please see the attached characteristics list					
Characteristics of impedance ratio at high temp. and low temp.	100kHz/+20℃	−55℃ Z/Z20℃	0.6 to 2.0					
		+105℃ Z/Z20℃	0.6 to 2.0					
Endurance	85℃, 1,000h, Rated voltage applied or 105℃,1,000h, category voltage applied	△C/C	Within±20% of the initial value					
		DF	≤ 1.5 times the initial limit					
		LC	≤ The initial limit					
Damp heat (Steady state)	60℃,90 to 95%RH,500h, No-applied voltage	△C/C	Within+40%,–20% of the initial value					
		DF	≤ 1.5 times the initial limit					
		LC	≤ 3 times the initial limit					
Surge	85℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value					
		DF	≤ The initial limit					
		LC	≤ 3 times the initial limit					

Dimensions



(unit: mm)

Size code	L ±0.2	W ±0.2	H ±0.1	S ±0.2	W1±0.1
B1	3.5	2.8	1.1	0.8	2.2

Size List

RV : Rated voltage

μF \ RV	2.5	4.0	6.3	8.0	10	12.5
10						B1
15						B1
22				B1		
33			B1		B1	
47		B1	B1			
56	B1					

TPC Series Characteristics List

Size code	SANYO Part number	Rated Voltage (V)	Rated Temperature (°C)	Rated Capacitance (μF)	Category Voltage (V)	Category Temperature (°C)	DF (%max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20°C	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow Temp. ≤ 260°C	MSL Reflow Temp. ≤ 250°C
B1	12TPC15M	12.5	85	15	10	105	10.0	18.8	80	800	3	3
	12TPC10M	12.5	85	10	10	105	10.0	12.5	80	800		
	10TPC33MB	10	85	33	8.0	105	10.0	33.0	70	1000		
	8TPC22M	8.0	85	22	6.3	105	10.0	17.6	70	1000		
	6TPC47MB	6.3	85	47	5.0	105	10.0	29.6	70	1000		
	6TPC33M	6.3	85	33	5.0	105	10.0	20.8	70	1000		
	4TPC47M	4.0	85	47	3.2	105	10.0	18.8	70	1000		
	2R5TPC56M	2.5	85	56	2.0	105	10.0	14.0	70	1000		

Please refer to page 141 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45°C

POSCAP SANYO

Conductive Polymer Type / Surface Mount Type **RoHS compliance**

TPD Series

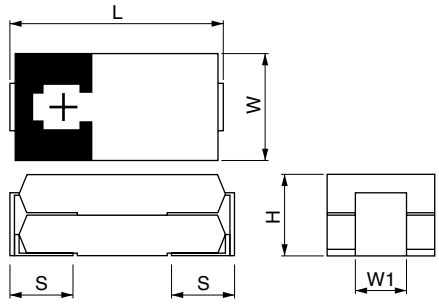
Low ESR ; High Capacitance Products

TPD series has low ESR and high capacitance.
It is the most suitable for the high frequency and high current switching power supply applications.

Specifications

Items	Condition		Specifications		
Rated voltage (V)	—		2.5	4.0	6.3
Surge voltage (V)	—		3.2	5.0	8.0
Category temperature range (℃)	—		−55 to +105		
Capacitance tolerance (%)	120Hz/20℃		M : ±20		
Rated capacitance range (μF)	120Hz/20℃		470 to 1000		
Dissipation Factor (DF)	120Hz/20℃		Please see the attached characteristics list		
Leakage current	Rated voltage applied, after 5 minutes		Please see the attached characteristics list		
Equivalent series resistance (ESR)	100kHz/20℃		Please see the attached characteristics list		
Characteristics of impedance ratio at high temp. and low temp.	100kHz/+20℃	−55℃ Z/Z20℃	0.6 to 2.0		
		+105℃ Z/Z20℃	0.6 to 2.0		
Endurance	105℃, 2,000h, Rated voltage applied	△C/C	Within±20% of the initial value		
		DF	≤ 1.5 times the initial limit		
		LC	≤ The initial limit		
Damp heat (Steady State)	60℃,90 to 95%RH,500h, No-applied voltage	△C/C	Within+40%,−20% of the initial value		
		DF	≤ 1.5 times the initial limit		
		LC	≤ 3 times the initial limit		
Surge	105℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value		
		DF	≤ The initial limit		
		LC	≤ 3 times the initial limit		

Dimensions



(unit: mm)

Size code	L ±0.3	W ±0.2	H ±0.2	S ±0.2	W1 ±0.1
D4D	7.3	4.3	3.6	1.3	2.4

Size List

RV : Rated voltage

μF \ RV	2.5	4.0	6.3
470	D4D		D4D
680	D4D	D4D	
1000	D4D		

TPD Series Characteristics List

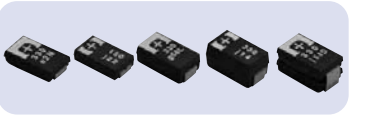
Size code	SANYO Part number	Rated Voltage (V)	Rated Temperature (°C)	Rated Capacitance (μF)	Category Voltage (V)	Category Temperature (°C)	DF (%max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20°C	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow Temp. ≤ 260°C	MSL Reflow Temp. ≤ 250°C
D4D	6TPD470M	6.3	105	470	6.3	105	10.0	296.1	10	4400	3	2a
	4TPD680M	4.0	105	680	4.0	105	10.0	272.0	10	4400		
	2R5TPD1000M	2.5	105	1000	2.5	105	10.0	250.0	10	4400		
	2R5TPD1000M8								8	4900		
	2R5TPD1000M6								6	5600		
	2R5TPD1000M5								5	6100		
	2R5TPD680M6	2.5	105	680	2.5	105	10.0	170.0	6	5600		
	2R5TPD680M5								5	6100		
	2R5TPD470M6	2.5	105	470	2.5	105	10.0	117.5	6	5600		
	2R5TPD470M5								5	6100		

Please refer to page 141 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45°C

TH Series

125℃ Guaranteed Products (THB/THC/THD/THE series)

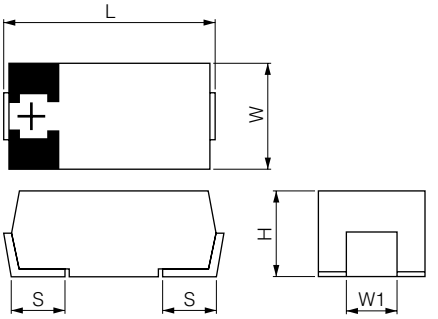


TH series has 125℃ capability guaranteed.
It is the most suitable for the high reliability industrial equipment.

Specifications

Items	Condition		Specifications													
Series	—		THB				THC				THD			THE		
Rated voltage (V)	—		2.5	4.0	6.3	10	2.5	4.0	6.3	10	2.5	4.0	6.3	2.5	4.0	6.3
Surge voltage (V)	—		3.2	5.0	8.0	13	3.2	5.0	8.0	13	3.2	5.0	8.0	3.2	5.0	8.0
Category temperature range (℃)	—		−55 to +125													
Capacitance tolerance (%)	120Hz/20℃		M : ±20													
Rated capacitance range (μF)	120Hz/20℃		100 to 1,000				68 to 220				330 to 680			150 to 330		
Dissipation Factor (DF)	120Hz/20℃		Please see the attached characteristics list													
Leakage current	Rated voltage applied, after 5 minutes		Please see the attached characteristics list													
Equivalent series resistance (ESR)	100kHz/20℃		Please see the attached characteristics list													
Characteristics of impedance ratio at high temp. and low temp.	100kHz/+20℃	−55℃ Z/Z20℃	0.6 to 2.0													
		+125℃ Z/Z20℃	0.6 to 2.0													
Endurance	125℃, 1,000h, category voltage applied	△C/C	Within±20% of the initial value													
		DF	≤ 2 times the initial limit													
		LC	≤ 2 times the initial limit													
Damp heat (Steady State)	60℃,90 to 95%RH, 500h, No-applied voltage	△C/C	Within+50%,−20% of the initial value(2R5THB1000M)													
			Within+40%,−20% of the initial value(Except for the above model)													
		DF	≤ 1.5 times the initial limit													
		LC	≤ 3 times the initial limit													
Surge	105℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value													
		DF	≤ The initial limit													
		LC	≤ 3 times the initial limit													

Dimensions



(unit: mm)

Size code	L ±0.3※1	W ±0.2	H ±0.1※2	S ±0.2	W1 ±0.1
D2E	7.3	4.3	1.8	1.3	2.4
D2	7.3	4.3	1.9	1.3	2.4
D3L	7.3	4.3	2.8	1.3	2.4
D4	7.3	4.3	3.8	1.3	2.4
D4D	7.3	4.3	3.6	1.3	2.4

※1 ±0.2:D2 ※1 ±0.2:D3L,D4,D4D

Size List

RV : Rated voltage

μF	Series \ RV	2.5	4.0	6.3	10
68	THC				D2
100	THB				D3L
150	THC			D2	
	THE			D2E	
220	THB			D3L	D4
	THC	D2	D2		
	THE		D2E		
330	THB	D3L	D3L	D4	D4
	THD			D4D	
	THE	D2E			
470	THB	D3L		D4	
	THD		D4D		
680	THB	D4	D4		
	THD	D4D			
1000	THB	D4			

TH Series Characteristics List

Series	Size code	SANYO Part number	Rated Voltage (V)	Rated Temperature (°C)	Rated Capacitance (μF)	Category Voltage (V)	Category Temperature (°C)	DF (%max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20°C	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow Temp. ≤ 260°C	MSL Reflow Temp. ≤ 250°C
THB	D3L	10THB100ML	10	105	100	6.3	125	8.0	100.0	55	1900	Under evaluation	5
		6THB220ML	6.3	105	220	4.0	125	10.0	138.6	40	2000		
		4THB330ML	4.0	105	330	2.5	125	10.0	132.0	40	2000		
		2R5THB470ML	2.5	105	470	1.6	125	10.0	117.5	40	2000		
		2R5THB330ML	2.5	105	330	1.6	125	10.0	82.5	55	1900		
	D4	10THB330M	10	105	330	6.3	125	10.0	330.0	35	3000		
		10THB220M	10	105	220	6.3	125	10.0	220.0	40	3000		
		6THB470M	6.3	105	470	4.0	125	15.0	296.1	35	3000		
		6THB330M	6.3	105	330	4.0	125	10.0	207.9	40	3000		
		4THB680M	4.0	105	680	2.5	125	15.0	272.0	35	3000		
		2R5THB1000M	2.5	105	1000	1.6	125	15.0	250.0	30	3000		
		2R5THB680M	2.5	105	680	1.6	125	10.0	170.0	40	3000		
THC	D2	10THC68M	10.0	105	68	6.3	125	10.0	68.0	45	1700		
		6THC150M	6.3	105	150	4.0	125	10.0	94.5	40	1900		
		4THC220M	4.0	105	220	2.5	125	10.0	88.0	40	1900		
		2R5THC220M	2.5	105	220	1.6	125	10.0	55.0	45	1700		
THE	D2E	6THE150M	6.3	105	150	4.0	125	10.0	94.5	25	2400		
		6THE150MI								18	2800		
		4THE220M	4.0	105	220	2.5	125	10.0	88.0	25	2400		
		4THE220MI								18	2800		
		4THE220MF								15	3100		
		2R5THE330M	2.5	105	330	1.6	125	10.0	82.5	25	2400		
		2R5THE330MI								18	2800		
		2R5THE330MF								15	3100		
THD	D4	6THD330M	6.3	105	330	4.0	125	10.0	207.9	10	4400		
		4THD470M	4.0	105	470	2.5	125	10.0	188.0	10	4400		
		2R5THD680M	2.5	105	680	1.6	125	10.0	170.0	10	4400		

Please refer to page 141 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45°C

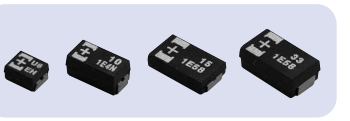
POSCAP SANYO

Conductive Polymer Type / Surface Mount Type

RoHS compliance

TQC Series

High Voltage Products

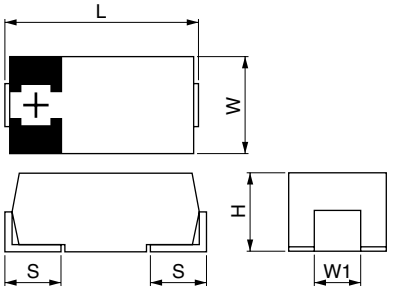


TQC series is perfect for high voltage, low ESR and low profile applications.
It is the most suitable for pass-con of the motor driver by 12V, the input of the DCDC converter.

Specifications

Items	Condition			Specifications		
Rated voltage (V)	—			16	20	25
Surge voltage (V)	—			20	23	29
Category temperature range (℃)	—			−55 to +105		
Capacitance tolerance (%)	120Hz/20℃			M : ±20		
Rated capacitance range (μF)	120Hz/20℃			5.6 to 100		
Dissipation Factor (DF)	120Hz/20℃			Please see the attached characteristics list		
Leakage current	Rated voltage applied, after 5 minutes			Please see the attached characteristics list		
Equivalent series resistance (ESR)	100kHz/20℃			Please see the attached characteristics list		
Characteristics of impedance ratio at high temp. and low temp.	100kHz/+20℃	−55℃	Z/Z20℃	1.0 to 2.0		
		+105℃	Z/Z20℃	0.6 to 1.0		
Endurance	105℃, 2,000h → 25TQC15M,25TQC22M (category voltage applied), 20TQC22M,16TQC33M,16TQC47M (rated voltage applied)	△C/C		Within±20% of the initial value		
	105℃, 1,000h → 25TQC5R6M,25TQC33M,25TQC22MV, 25TQC15MV,25TQC10M (category voltage applied), 20TQC8R2M,20TQC47M,16TQC10M,16TQC68M,20TQC15M, 16TQC22M,16TQC15M,16TQC100M (rated voltage applied)	DF		≤ 1.5 times the initial limit		
		LC		≤ The initial limit		
Damp heat (Steady State)	60℃,90 to 95%RH,500h, No-applied voltage	△C/C		Within+40%,−20% of the initial value		
		DF		≤ 1.5 times the initial limit		
		LC		≤ 3 times the initial limit		
Surge	15 to 35℃, 1,000 times, 1kΩ discharge resistance, surge voltage applied	△C/C		Within±5% of the initial value		
		DF		≤ The initial limit		
		LC		≤ 3 times the initial limit		

Dimensions



(unit: mm)

Size code	L±0.2※1	W±0.2	H±0.1※2	S±0.2	W±0.1
B2	3.5	2.8	1.9	0.8	2.2
C	6.0	3.2	2.8	1.3	1.8
D2	7.3	4.3	1.9	1.3	2.4
D3L	7.3	4.3	2.8	1.3	2.4
D3	7.3	4.3	3.1	1.3	2.4

※1 ±0.3:D3L ※2 ±0.2:C,D3L

Size List

RV : Rated voltage

μF \ RV	16	20	25
5.6			B2
8.2		B2	
10	B2		C
15	B2	C	D2
22	C	D2	D2
33	D2		D3L
47	D2	D3L	
68	D3L		
100	D3		

TQC Series Characteristics List

Size code	SANYO Part number	Rated Voltage (V)	Rated Temperature (°C)	Rated Capacitance (μF)	Category Voltage (V)	Category Temperature (°C)	DF (%max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20℃	Maximum allowable ripple current (mArms) 100kHz※3	MSL Reflow Temp. < 260°C	MSL Reflow Temp. ≤ 250°C
B2	25TQC5R6M	25※4	85	5.6	20	105	10.0	42.0	100	800	Under evaluation	3
	20TQC8R2M	20	105	8.2	—	—	10.0	49.2	100	800		
	16TQC15M	16	105	15	—	—	10.0	72.0	90	1000		
	16TQC10M	16	105	10	—	—	10.0	48.0	100	800		
C	25TQC10M	25※4	85	10	20	105	10.0	25.0	95	900		
	20TQC15M	20	105	15	—	—	10.0	30.0	80	1000		
	16TQC22M	16	105	22	—	—	10.0	35.2	80	1000		
D2	25TQC22M	25※4	85	22	20	105	10.0	44.0	90	1000		
	25TQC22MV	25※4	85	22	20	105	10.0	55.0	45	1500		
	25TQC15M	25※4	85	15	20	105	10.0	38.0	90	1000		
	25TQC15MV	25※4	85	15	20	105	10.0	38.0	45	1500		
	20TQC22M	20	105	22	—	—	10.0	44.0	80	1300		
	16TQC33M	16	105	33	—	—	10.0	52.8	70	1400		
	16TQC47M	16	105	47	—	—	10.0	75.2	70	1400		
D3L	25TQC33M	25※4	85	33	20	105	10.0	82.5	60	1400		
	20TQC47M	20	105	47	—	—	10.0	94.0	55	1450		
	16TQC68M	16	105	68	—	—	10.0	108.8	50	1500		
D3	16TQC100M	16	105	100	—	—	10.0	160.0	50	1800		

※3 100k to 500kHz,105°C
※4 Please reduce 0.25V per 1°C from over 85°C for 25V products