Think GAIA
For Life and the Earth

SANYO

SANYO Capacitors General Catalog

2009-7

OS-CON

Aluminum Solid Capacitors with Conductive Polymer

Aluminum Solid Capacitors with Organic Semiconductive Electrolyte

POSCAP

Tantalum Solid Capacitors with Conductive Polymer

www.edc.sanyo.com

2009

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OS-CON

Tantalum Solid Capacitors with Conductive Polymer

POSCAP

Think GAIA

For Life and the Earth

"GAIA" is a term that encompasses the Blue Planet, "Earth,"
and the infinite varieties of "life" that live and breathe on it.
It describes the world as a single living organism,
where all life and nature co-exist interdependently.
SANYO is committed to listening to GAIA's voice
and engaging in activities that are beneficial to life and the Earth.
As a testament to this, SANYO pledges to respond by
developing only products that are absolutely essential to
life and the Earth.
We aim to bequeath a beautiful Earth to future generations.
This is SANYO's Brand Vision - Think GAIA.
To realize this vision,and in line with its aim to become
a leading company for energy and environment,
SANYO seeks to harness its exclusive, unique technology
and innovative creativity to deliver global solutions.
All for the Earth. All for life. All for GAIA.

PRECAUTIONS

- The contents of this catalog are current as of July 2009. 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.
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- 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.

INDEX

Our capacitors are used for the most

Personal computer / Peripheral

- Notebook PC
- Desktop PC
- Printer / Scanner
- Server
- Monitor
- Copy
- Graphic board
- Router etc.

OS-CON

New SVPF, SVP, SVPE, SEPC, SVPC, SEP, SVPB, SP, SVPA, SS, SVQP

POSCAP

TPSF, TPB, TPL, TPC, TPF, TPD, TPLF, TQC, TPE

Audio / Visual

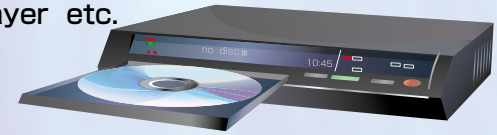
- PDP / LCD-TV
- Blu-ray recorder / player
- DVD recorder / player
- Projector
- Audio
- Portable media player
- Portable audio player etc.

OS-CON

New SVPF, SVP, SVPE, SEP, SVPS, SP, SVPC, SC, SVPB, SL, SVPA, SH

POSCAP

TPSF, TPU, TPF, TPE, TPB, TPC, TPD, TQC



Car electronics

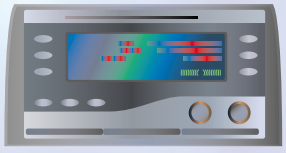
- Car navigation / car audio
- Car electronics etc.

OS-CON

SVPD, SVQP, SVP

POSCAP

TA, TPE, TPB, TPC



advanced equipments as follows.

Cellular phone

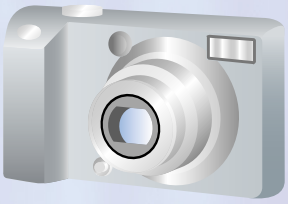
POSCAP

TPU TPE
TPG TPB
TPC

DSC

OS-CON

SVP



POSCAP

TPU
TPG
TPE
TPB
TPC

Game

- Game machine
- Portable game etc.

OS-CON

New SVPF
SVPE
SVPC
SVPA

POSCAP

TPSF
TPU
TPF
TPE
TPD

Information technology

- POS system
- Card reader
- IP telephone
- Wireless
- Ubiquitous etc.

OS-CON

New SVPF SVPA
SVPE SVP
SVPC

POSCAP

TQC

PDA / Ele. Dictionary

POSCAP

TPU TPB
TPG TPC
TPE TQC

Factory / Enterprise

- Factory appliance
- Security
- Money changer
- LED Indicate-machine
- Enterprise camera etc.

OS-CON

New SVPF SVP
SVPE SEQP
SVPS SEP
SVPD SP
SVPC SC
SVPA SA
SVQP SL

POSCAP

TPE
TA
TH
TQC

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 Solid Capacitors with Conductive Polymer — OS-CON
Aluminum Solid Capacitors with Organic Semiconductive Electrolyte — OS-CON
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.
There is no bi-polar model of OS-CON and POSCAP.

Rated and category

The definition of rated and category is as follows.

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

Operating temperature and ripple current

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

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.

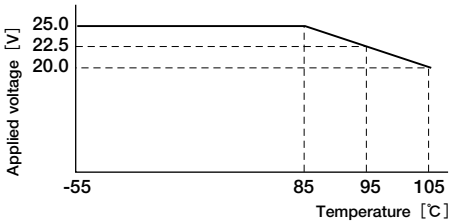
Applied voltage for designing

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



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 (OS-CON)

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.

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.

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.

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% (1,500ppm) 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

Solid elctrolytic capacitors with long life, useful for every industry around the world

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 2,700 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℃ 85%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

①Since 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
		6SL33M	10SL33M
		6SL47M	10SL47M
SH	A	16SH1M	25SH1M
		16SH1R5M	25SH1R5M
	C	16SH10M	25SH10M

Series	Size code	Applicable model	Alternative model
SVP	A5	6SVP15M	10SVP15M
		4SVP22M	6SVP22M
	B6	10SVP22M	16SVP22M
		6SVP33M	10SVP33M
	C6	6SVP56M	10SVP56M
		4SVP82M	6SVP82M
	E7	10SVP82M	16SVP82M
		6SVP120M	10SVP120M
		6SVP150M	10SVP150MX
		4SVP150M	10SVP150MX
		4SVP220M	6SVP220MX
	F8	4SVP470M	6SVP470MX
SVQP	E7	6SVQP150M	10SVQP150M
		4SVQP220M	6SVQP220M

②Production 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.

⚠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% / 1,000h (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 φ10 and 1A or less on φ6.3, 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 φ10, 0.5A or less on φ8 and 0.2A or less on φ6.3, 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)

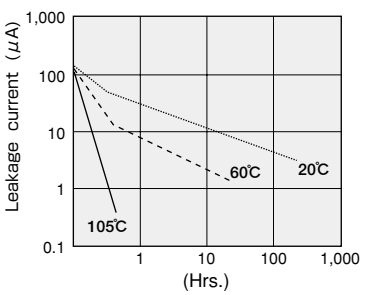
When life span exceeded the specified guarantee time of Endurance and Damp heat, electrolyte might insulate and cause electric characteristic changed. This is called an open circuit.
The electric characteristics of capacitance and ESR may possibly change within the specified range in specifications when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

Other precautions

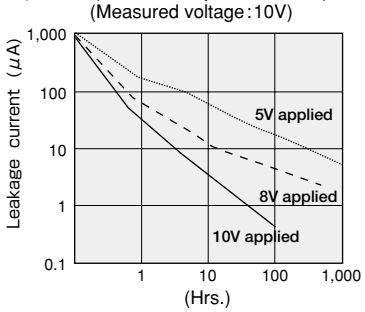
1 Leakage current

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℃)
(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 Rapid charge and discharge limitation

Excessive rush current due to rapid charge and discharge may pose short circuit or large leakage current, so a protection circuit is recommended to maintain high reliability.
Apply a protection circuit when rush current is over 10A.
On capacitors that 10 times of the allowable ripple current value is over 10A, a protection circuit should be applied when rush current is over 10 times of the allowable ripple current.

3 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 6 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.

4 Flow soldering

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

Recommended flow soldering condition

	Temperature	Time	Flow number
Preheating	120℃ or less (ambient temperature)	120 sec. or less	1 time
Soldering condition	260 + 5℃ 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 6 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.

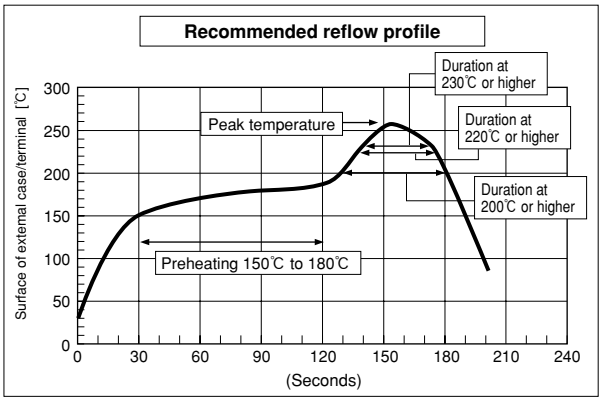
(d) Note that flux does not adhere to anywhere expect the lead terminal.

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

5 Reflow soldering

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

Recommended reflow soldering condition



Item \ Series	Conductive polymer electrolyte SMD type	
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.

6 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.

7 Cleaning PCB

Check the following items before washing PC board with these detergents: high quality alcohol-based cleaning fluid such as Pine-α ST-100S, clean thru 750H, 750L, 710M, 750K or Techno Care FRW 14 through 17 or detergents including substitute freon as AK-225AES or IPA.

(a) Use immersion or ultrasonic waves to clean within 2 minutes 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.

8 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.

9 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 from factories	Within 30 days from opening (packaged with carrier tape)
Radial lead type	Bag packing product	Within 30 month after shipment from factories	Within 7 days from opening
	Taping product	Within 24 month after shipment from factories	

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

※ Please contact SANYO for Organic Semiconductor type.

Product line-up table

OS-CON

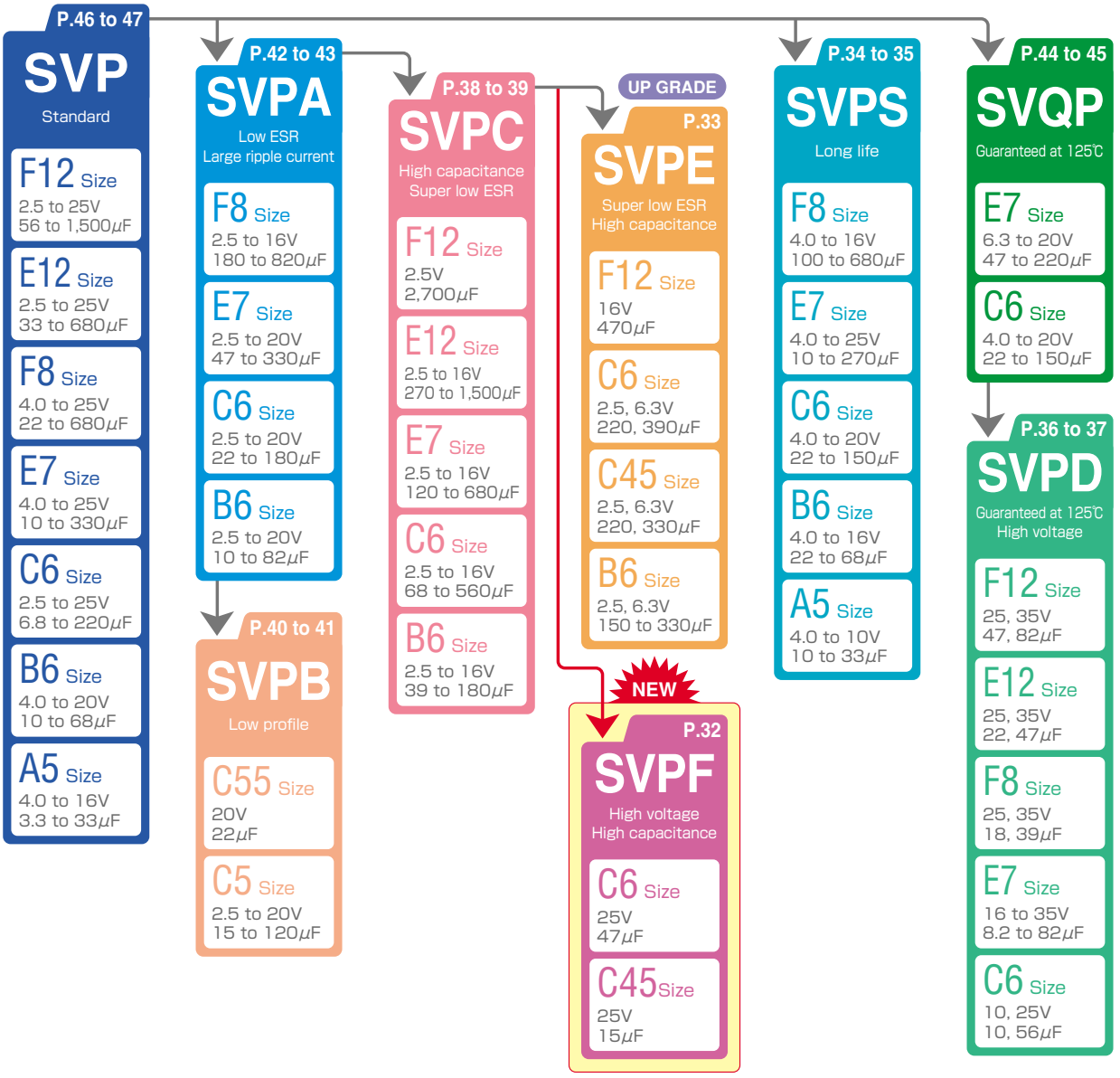
Classification		Series	Page	Features	Small size・Low profile	High capacitance	Low ESR	High voltage	Long life High temperature	Category temperature range (℃)	Rated voltage range (V.DC)	Capacitance range (μF)	External appearance	Marking color
Conductive polymer electrolyte	SMD type	New SVPF	32	Small size・Low profile High voltage High capacitance	●	●		●		−55 to +105	25	15 to 47	–	Purple
		UP GRADE SVPE	33	Super low ESR High capacitance		●	●			−55 to +105	2.5 to 16	150 to 470	–	Purple
		SVPS	34 to 35	Long life					●	−55 to +105	4.0 to 25	10 to 680	–	Purple
		SVPD	36 to 37	Guaranteed at 125℃ Rated 35V max.				●	●	−55 to +125	10 to 35	8.2 to 82	–	Purple
		SVPC	38 to 39	High capacitance Super low ESR		●	●			−55 to +105	2.5 to 16	39 to 2,700	–	Purple
		SVPB	40 to 41	Low profile	●					−55 to +105	2.5 to 20	15 to 120	–	Purple
		SVPA	42 to 43	Low ESR Large ripple current			●			−55 to +105	2.5 to 20	10 to 820	–	Purple
		SVQP	44 to 45	Guaranteed at 125℃					●	−55 to +125	4.0 to 20	22 to 220	–	Purple
		SVP	46 to 47	Standard						−55 to +105	2.5 to 25	3.3 to 1,500	–	Purple
	Radial lead type	UP GRADE SEPC	48 to 49	Super low ESR High capacitance Small size・Low profile	●	●	●			−55 to +105	2.5 to 16	100 to 2,700	–	Purple
		SEQP	50 to 51	105℃ 5,000h Guaranteed at 125℃ High voltage				●	●	−55 to +125	4.0 to 32	6.8 to 1,200	–	Purple
		SEP	52 to 53	Standard						−55 to +105	2.5 to 25	6.8 to 1,500	–	Purple
Organic semiconductor electrolyte	Radial lead type	SF	54 to 55	5mm height max.	●					−55 to +105	4.0 to 6.3	150 to 220	Purple	White
		SP	56 to 57	High capacitance Low ESR (for audio)		●	●			−55 to +105	2.0 to 25	6.8 to 2,200	Purple	White
		SC	58 to 59	Standard						−55 to +105	6.3 to 30	1.0 to 47	Purple	White
		SA	60 to 61	High capacitance Small size	●	●				−55 to +105	6.3 to 20	15 to 2,200	Purple	White
		SL	62 to 63	Low profile	●					−55 to +105	4.0 to 25	1.0 to 220	Purple	White
		SH	64 to 65	Long life					●	−55 to +105	6.3 to 25	1.0 to 330	Purple	White
		SS	66 to 67	Small size	●					−55 to +105	4.0 to 20	2.2 to 470	Purple	White

SANYO

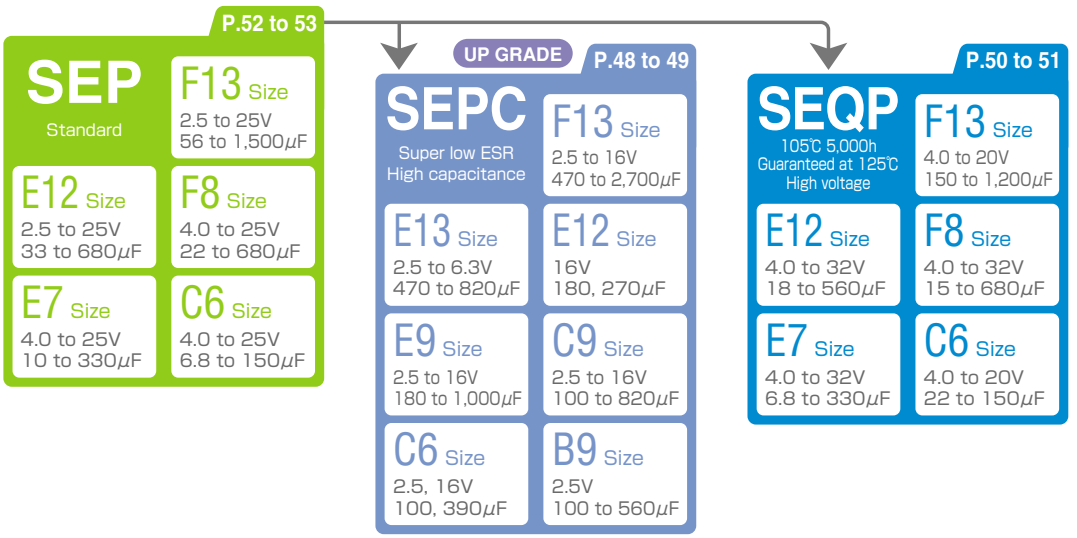
Series system diagram

OS-CON

SMD type with conductive polymer electrolyte



Radial lead type with conductive polymer electrolyte



Series system diagram

OS-CON

Radial lead type with organic semiconductive electrolyte

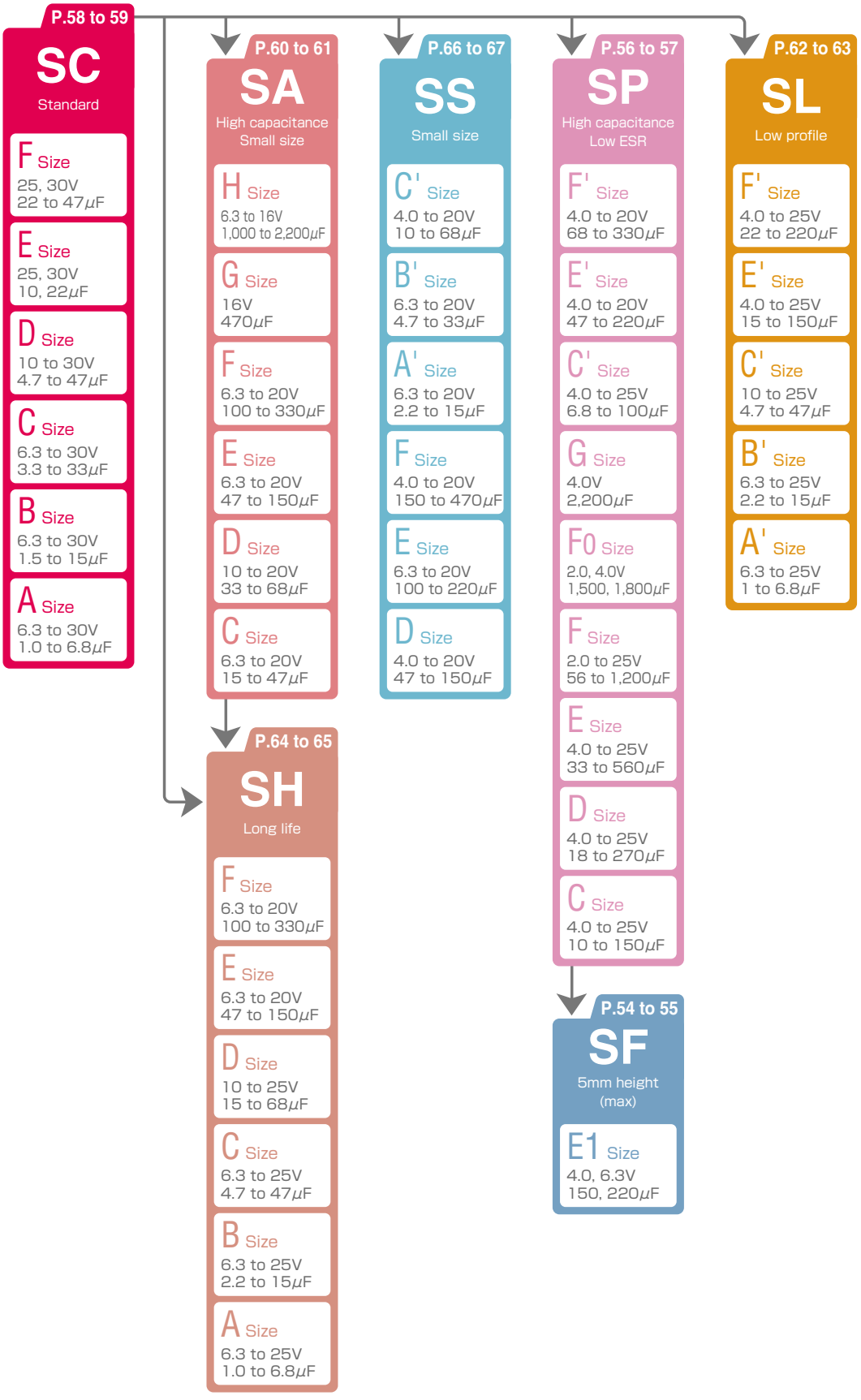
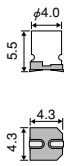
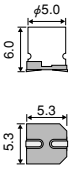
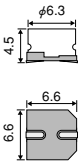
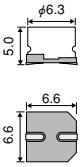
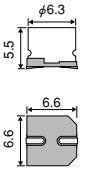
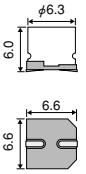
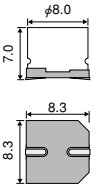
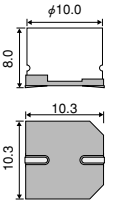
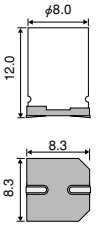
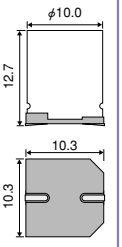


Image of case size

OS-CON

SMD type with conductive polymer electrolyte

(Unit:mm)

A5 Size	B6 Size	C45 Size	C5 Size	C55 Size	C6 Size	E7 Size	F8 Size	E12 Size	F12 Size
									
P.34 to 35	P.33	P.32	P.40 to 41	P.40 to 41	P.32	P.34 to 35	P.34 to 35	P.36 to 37	P.33
SVPS	SVPE	SVPF New	SVPB	SVPB	SVPF New	SVPS	SVPS	SVPD	SVPE
P.46 to 47	P.34 to 35	P.33			P.33	P.36 to 37	P.36 to 37	P.38 to 39	P.36 to 37
SVP	SVPS	SVPE			SVPE	SVPD	SVPD	SVPC	SVPD
	P.38 to 39				P.34 to 35	P.38 to 39	P.42 to 43	P.46 to 47	P.38 to 39
	SVPC				SVPS	SVPC	SVPA	SVP	SVPC
	P.42 to 43				P.36 to 37	P.42 to 43	P.46 to 47		P.46 to 47
	SVPA				SVPD	SVPA	SVP		SVP
	P.46 to 47				P.38 to 39	P.44 to 45			
	SVP				SVPC	SVQP			
					P.42 to 43	P.46 to 47			
					SVPA	SVP			
					P.44 to 45				
					SVQP				
					P.46 to 47				
					SVP				

Radial lead type with conductive polymer electrolyte

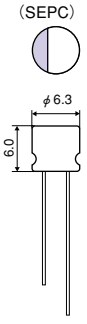
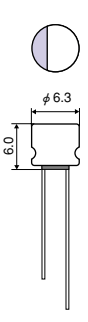
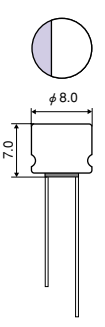
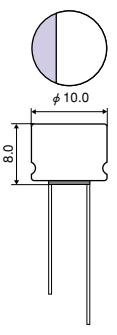
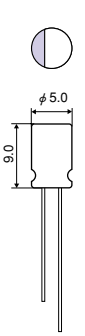
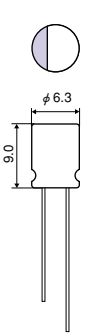
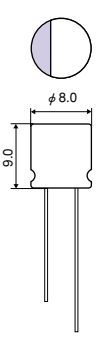
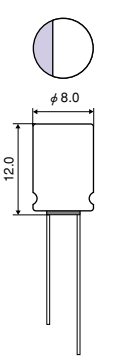
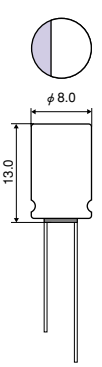
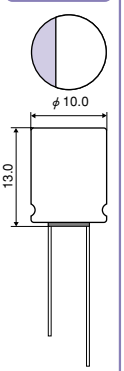
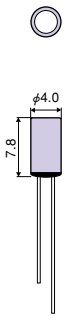
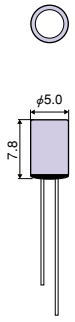
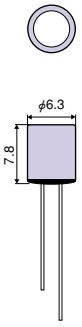
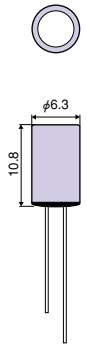
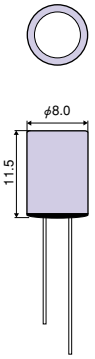
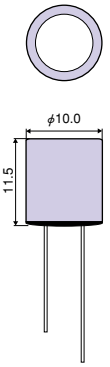
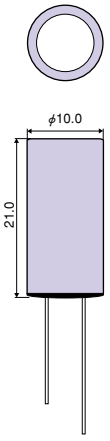
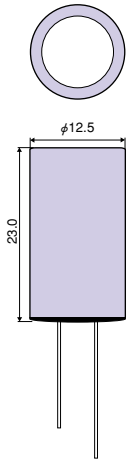
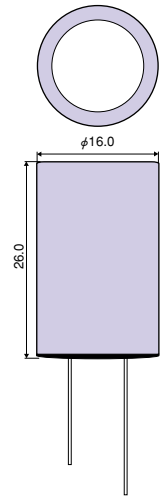
C6 Size	C6 Size	E7 Size	F8 Size	B9 Size	C9 Size	E9 Size	E12 Size	E13 Size	F13 Size
(SEPC) 									
P.48 to 49	P.50 to 51	P.50 to 51	P.50 to 51	P.48 to 49	P.48 to 49	P.48 to 49	P.48 to 49	P.48 to 49	P.48 to 49
SEPC	SEQP	SEQP	SEQP	SEPC	SEPC	SEPC	SEPC	SEPC	SEPC
	P.52 to 53	P.52 to 53	P.52 to 53				P.50 to 51		P.50 to 51
	SEP	SEP	SEP				SEQP		SEQP
							P.52 to 53		P.52 to 53
							SEP		SEP

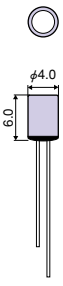
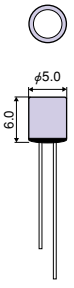
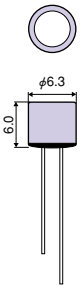
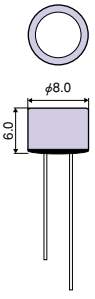
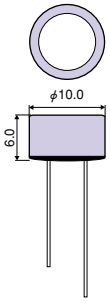
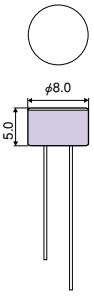
Image of case size

OS-CON

Radial lead type with organic semiconductive electrolyte

(Unit:mm)

A Size	B Size	C Size	D Size	E Size	F Size	F0 Size	G Size	H Size
								
P.58 to 59 SC P.64 to 65 SH	P.58 to 59 SC P.64 to 65 SH	P.56 to 57 SP P.58 to 59 SC P.60 to 61 SA P.64 to 65 SH	P.56 to 57 SP P.58 to 59 SC P.60 to 61 SA P.64 to 65 SH P.66 to 67 SS	P.56 to 57 SP P.58 to 59 SC P.60 to 61 SA P.64 to 65 SH P.66 to 67 SS	P.56 to 57 SP P.58 to 59 SC P.60 to 61 SA P.64 to 65 SH P.66 to 67 SS	P.56 to 57 SP	P.56 to 57 SP P.60 to 61 SA	P.60 to 61 SA

A' Size	B' Size	C' Size	E' Size	F' Size	E1 Size
					
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※ Profile of case size are all expressed in maximum values.

Products list

OS-CON

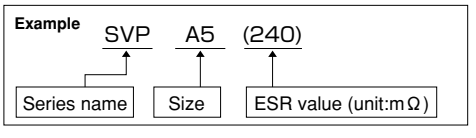
Size・ESR Matrix list / SMD type

V / μF	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)	SVPE B6(12)		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)			SVPE B6(15)			
220	SVP C6(23)			SVPE C45(18) 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	SVPE B6(10)	SVPS E7(22)	SVPA E7(22)			SVPC E7(22)	SVP F8(25)
330	SVPE B6(15) SVPE C45(16) 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)			
1,200		SVPC E12(12)	SVP F12(12)				
1,500	SVPC E12(10) SVP F12(12)	SVPC E12(12)					
2,700	SVPC F12(12)						

●…Conductive polymer type

How to read the lists in P18 to 21

- 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 P32 to P67.
- 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)		New SVPF C45(55)		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)	New SVPF C6(30) 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
SVPE F12(10)						470
						560
						680
						820
						1,200
						1,500
						2,700

●…Conductive polymer type

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

A5	φ4.0×L5.5	C6	φ6.3×L6.0
B6	φ5.0×L6.0	E7	φ8.0×L7.0
C45	φ6.3×L4.5	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

SANYO

Products list

OS-CON

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(7) 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)			
1,000	SP F(11)	SEPC E9(7)	SP F(12)					
1,200		SP F(12)	SEQP F13(12)	SEP F13(12)				
1,500		SEP F13(12)	SP Fo(8)		SEPC F13(10)			
1,800	SP Fo(8)							
2,200			SP G(9)		SA H(15)			
2,700		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) SEPC E9(10)	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)								1,000
								1,200
								1,500
								1,800
								2,200
								2,700

●···Conductive polymer type ●···Organic semiconductive electrolyte type

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

A	φ4.0×L7.8	D	φ6.3×L10.8	Fo	φ10.0×L21.0	A'	φ4.0×L6.0	E'	φ8.0×L6.0
B	φ5.0×L7.8	E	φ8.0×L11.5	G	φ12.5×L23.0	B'	φ5.0×L6.0	F'	φ10.0×L6.0
C	φ6.3×L7.8	F	φ10.0×L11.5	H	φ16.0×L26.0	C'	φ6.3×L6.0	E1	φ8.0×L10.0

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
SVPF series

Rated capacitance

Example

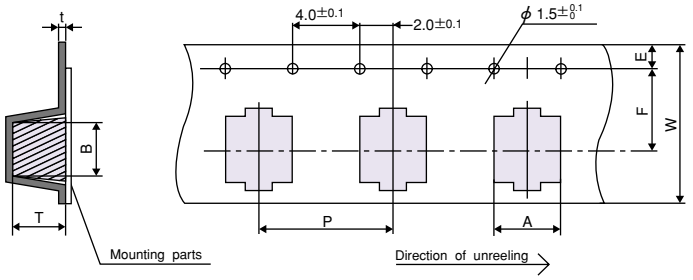
Rated cap.(μF)	Code
3.3	3R3
4.7	4R7
10	10
22	22
100	100
220	220
470	470
1,500	1,500

Capacitance tolerance

Cap. tolerance	Code
±20%	M

2. Taping

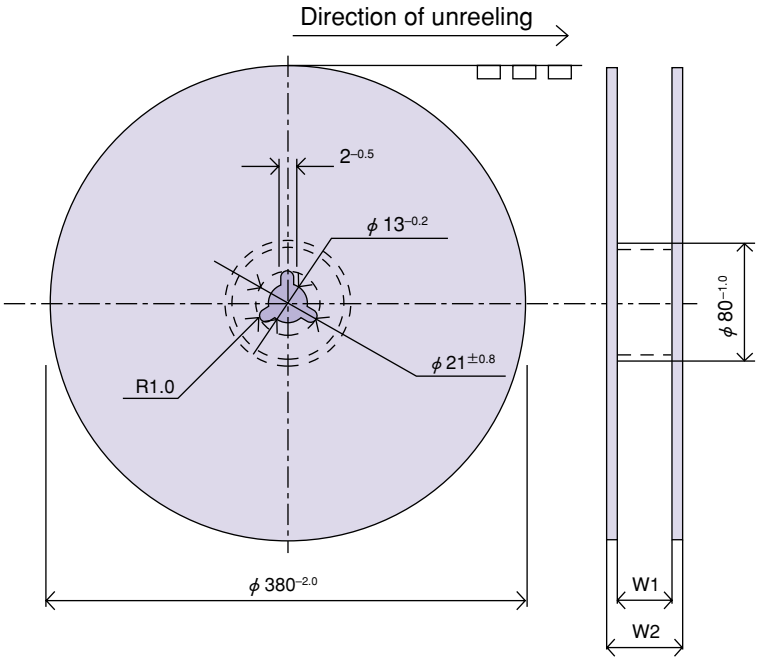
2-1. Carrier tape



(unit : mm)

Size code \ Dimension	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
C45	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
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

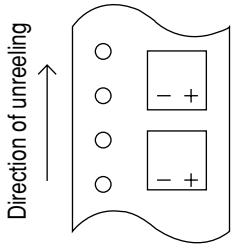
2-2. Reel



(unit : mm)

Size code	W1	W2
A5	13.0±0.5	17.5±1.0
B6, C45, 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	2,000
B6	1,500
C45	1,300
C5	1,300
C55	1,000
C6	1,000
E7	1,000
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
1,000	1,000
2,700	2,700

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.

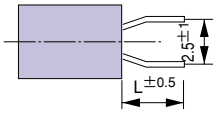
2. Lead terminal process

2-1. Applications

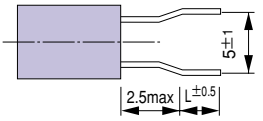
※ The following table is a standard specification. Please contact us concerning other specifications and +S taping.

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	B9,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

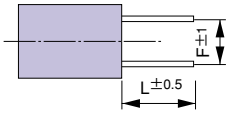
2-2. Lead terminal cutting

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)	

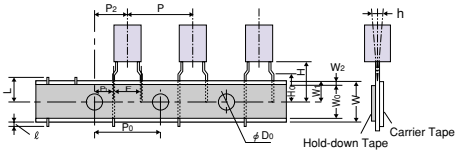
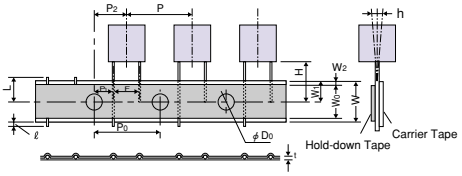
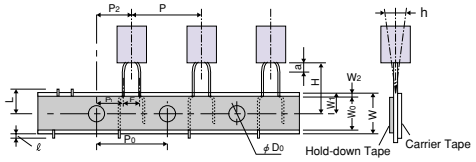
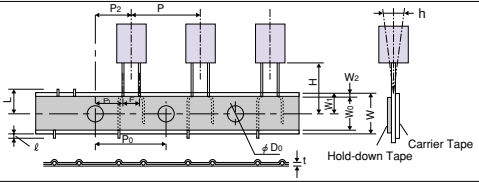
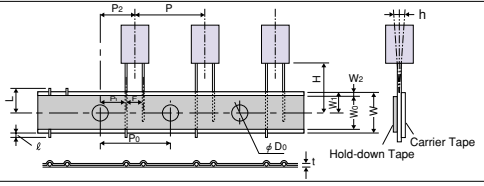
	F	F1	F2
L	5.5	4.5	3.0

+C3	Straight cut	A (φ4) B, B', B9 (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', B9	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=2.0mm F=2.5mm F=3.5mm	B9 (φ5) C6,C9 (φ6.3) E7,E9,E12 (φ8)	

(unit : mm)

Code		F	P	P_0	P_1	P_2	Δh	W	W_0	W_1	W_2	H	H_0	φD_0	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)	φ5	2.0	12.7	12.7	5.35	6.35	0	18.0	9.5	9.0	2.5	17.5	-	4.0	0.6	0	11.0	-
	φ6.3	2.5	12.7	12.7	5.10	6.35	0	18.0	9.5	9.0	2.5	17.5	-	4.0	0.6	0	11.0	-
	φ8	3.5	12.7	12.7	4.60	6.35	0	18.0	9.5	9.0	2.5	17.5	-	4.0	0.6	0	11.0	-

3. Minimum packing quantity

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
Fo	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	2,000
B,B',B9	φ 5	2,000
C,C',C6,C9,D	φ 6.3	1,500
E,E',E7,E9,E12,E13,E1	φ 8	1,000
F,F',F8,F13	φ 10	500

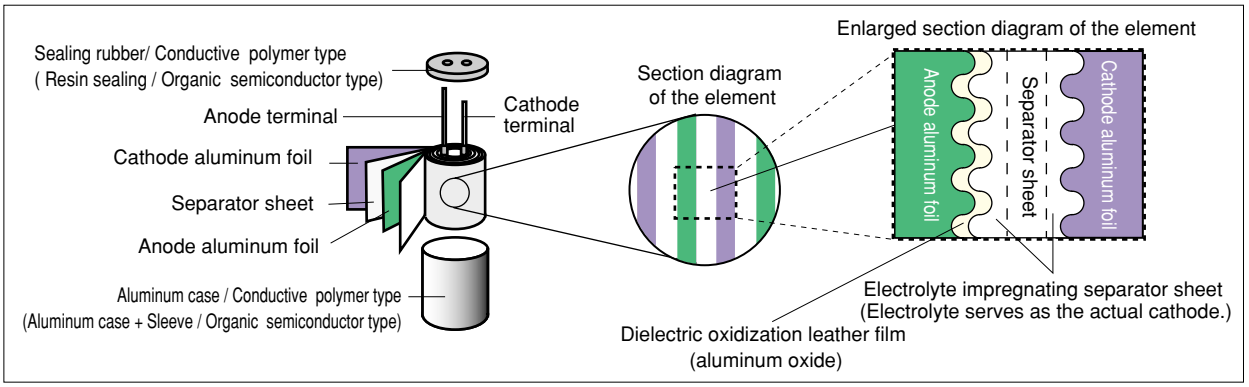
※ Ordering information
φ10(Fo), φ12.5 and φ16 are packing type only.

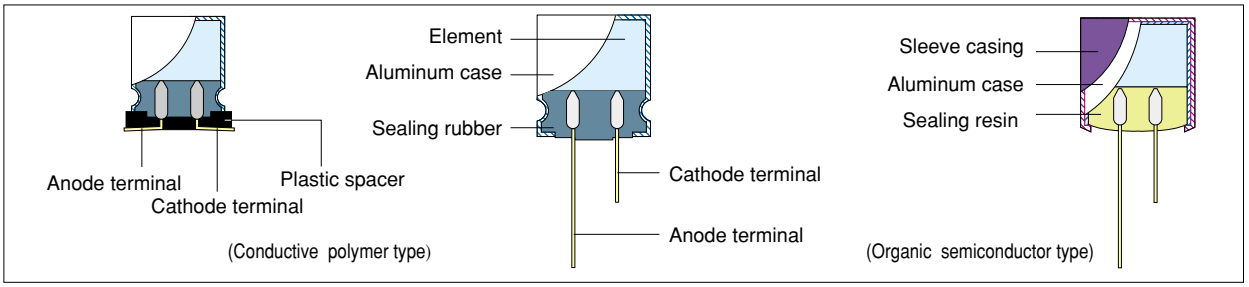
1. Basic structure of OS-CON

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

Aluminum electrolytic capacitor	Separator sheet (electrolyte) impregnated with electrolytic solution.	Liquid electrolyte
OS-CON (Organic semiconductor type)	Separator sheet (electrolyte) impregnated with organic semiconductor.	Solid electrolyte
OS-CON (Conductive polymer type)	Separator sheet (electrolyte) impregnated with conductive polymer.	Solid electrolyte

1-1. Basic construction





- Increased surface area of the aluminum electrode foil (high-speed processing to form rough surface) results in larger capacitance (greater charge density).
- Electrolyte is impregnated so that the rough dielectric aluminum oxide film at the anode aluminum foil sticks close to the cathode aluminum foil.
- Higher conductivity electrolyte is ideal.

2. Differences of electrolyte and in characteristics between OS-CON and an electrolytic capacitor

	Aluminum electrolytic capacitor	OS-CON	
		Organic semiconductor type	Conductive polymer type
Conductivity	3(mS/cm)	300(mS/cm)	3,000(mS/cm)
	・Difficult to lower ESR due to ionic conduction ・ESR augments, in particular, in low temperature conditions	・High electronic conductivity facilitate to achieve low ESR ・ESR is stable in low temperature conditions	・The highest electronic conductivity, realizing super low ESR. ・ESR is stable in low temperature conditions
Reliability, lifespan	・Liquid electrolyte is evaporable at high temperature ・Static capacitance is on the decline at high temperature ・Limited lifespan resulting from dry-up ・Major fluctuations in temperature characteristics	・Solid electrolyte with little evaporation ・Less decrease in static capacitance ・Long lifespan even at high temperature ・Minor fluctuations in temperature characteristics	・Solid electrolyte with little evaporation ・Little decrease in static capacitance ・Long lifespan even at high temperature ・Very minor fluctuations in temperature characteristics
Temperature coefficient	2 times by 10℃ reduction	10 times by 20℃ reduction	10 times by 20℃ reduction
	105℃/2,000h→85℃/8,000h	105℃/2,000h→85℃/20,000h	105℃/2,000h→85℃/20,000h

1. OS-CON Electrical characteristics

1-1. Frequency characteristics

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

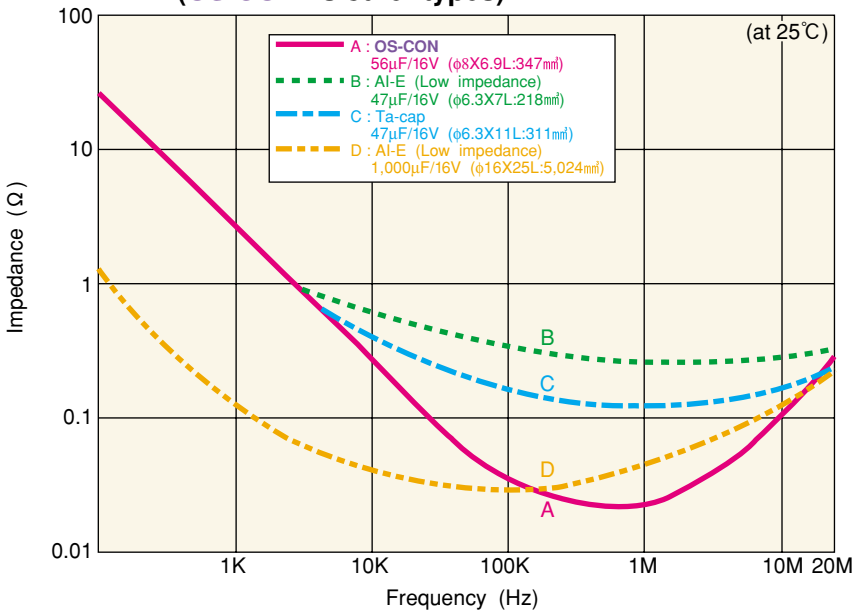
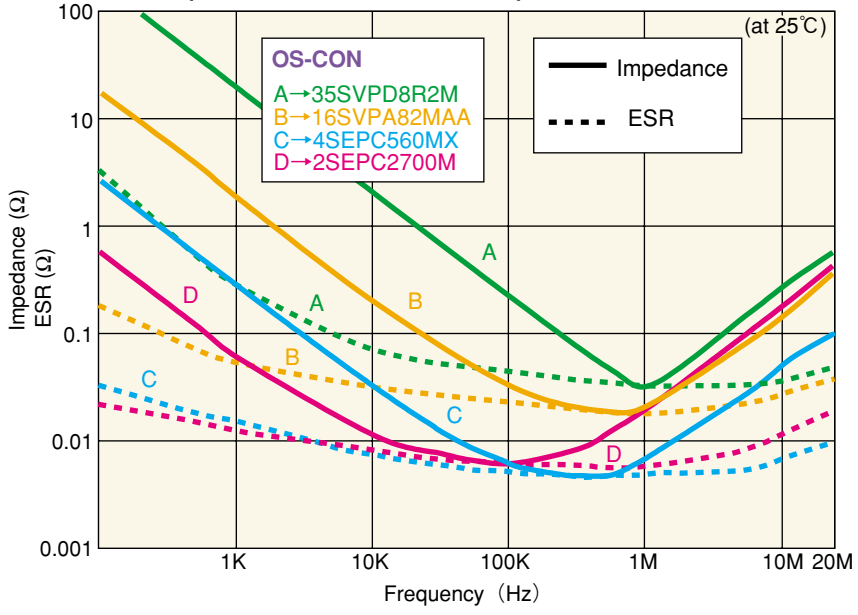


Fig.B Impedance & ESR frequency characteristics (several OS-CON models)



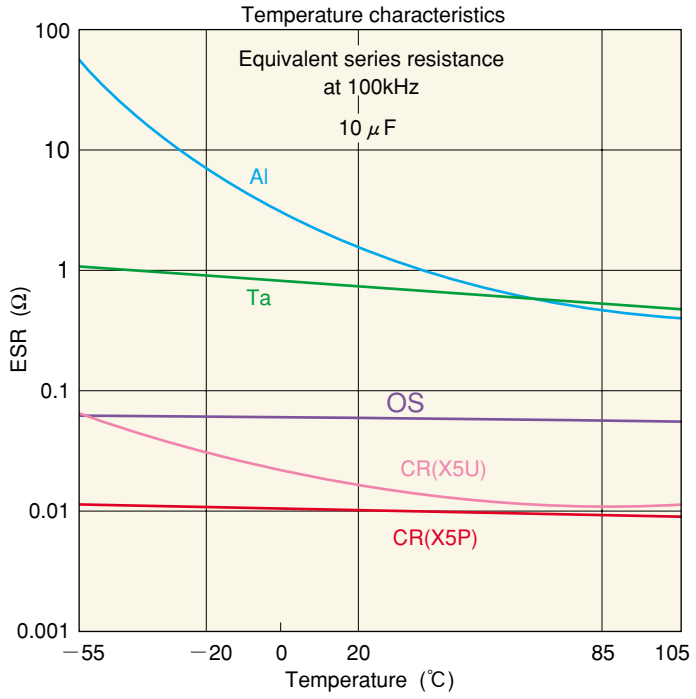
OS-CON is an electrolytic capacitor that has excellent frequency characteristics. It improves ESR greatly, and provides the excellent frequency characteristics because OS-CON use a high conductive polymer as electrolyte.

Fig.A: The OS-CON's frequency characteristic shows a nearly ideal curve. When compared at 100kHz, OS-CON 56 μF, and low impedance aluminum electrolytic capacitor 1,000 μF nearly have the same feature.

Fig.B: The resonance point of the OS-CON is at 100kHz to 10MHz. The ESR is an extremely small value approximately 5mΩ at 100kHz of 560 μF.

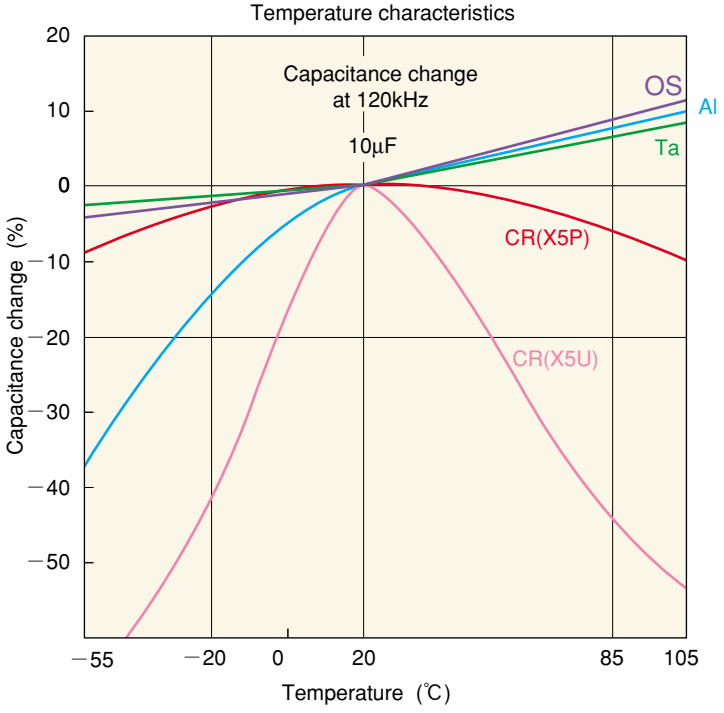
1-2. Characteristics at high temperature and low temperature

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



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

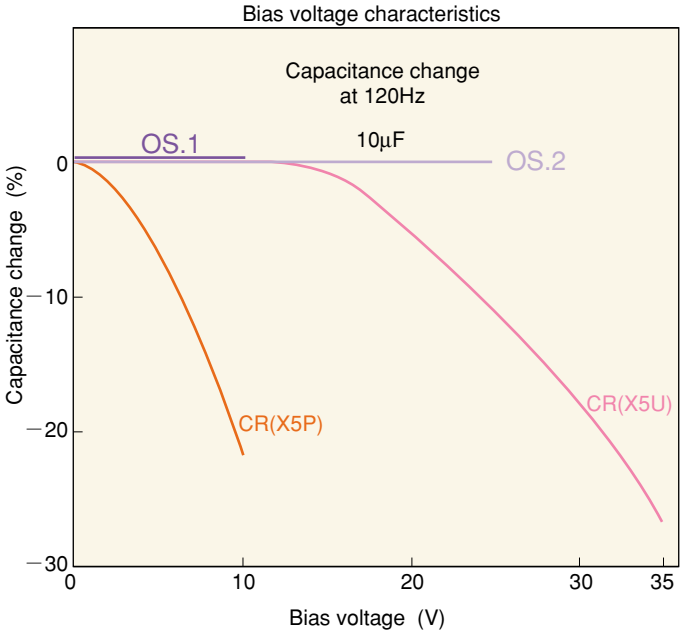
Fig.B Capacitance temperature characteristics (OS-CON vs other types)



OS-CON's Characteristics at high temperature and low temperature is that it features little change in temperature for the ESR.
What ESR changes a little against temperature means that noise clearing ability changes a little against temperature as well. The **OS-CON** is suitable for outdoor apparatus.

1-3. Bias characteristics

(a) Capacitance



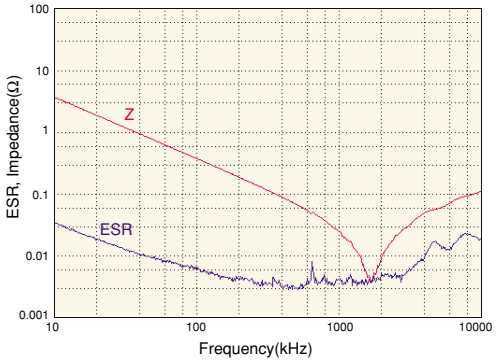
OS.1 =**OS-CON(10SVP10M)** —— Purple
OS.2 =**OS-CON(25SVPD10M)** — Light Purple
CR(X5P) =Cera Cap. ———— Red
(X5P Type ; 10V-10μF)
CR(X5U) =Cera Cap. ———— Pink
(X5U Type ; 50V-10μF)

When voltage is applied to ceramic capacitors, they show a bias characteristics where static capacitance is reduced. Our **OS-CON** product, however, will show no reduction in capacitance for applied voltage within its rating (Note: our 25V product utilized temperature derated voltage).

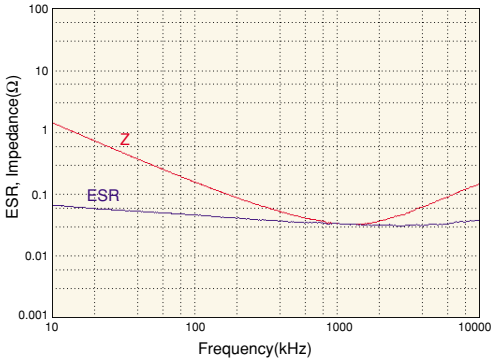
(b) Impedance, ESR

Bias characteristics of OS-CON & ceramic capacitors

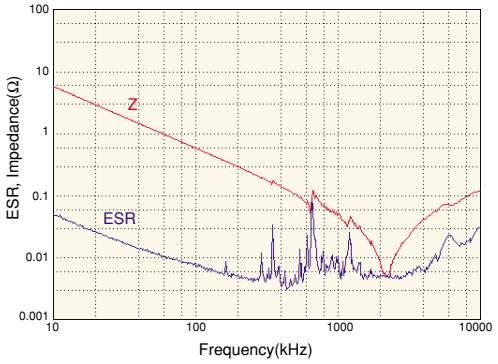
Multi-layer ceramic capacitor (25V, 4.7μF)
0V bias



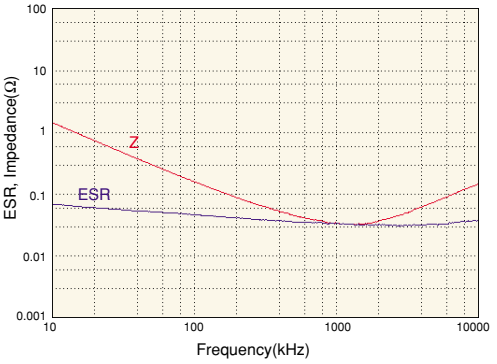
OS-CON (25SVPD10M)
0V bias



Multi-layer ceramic capacitor (25V, 4.7μF)
20V bias

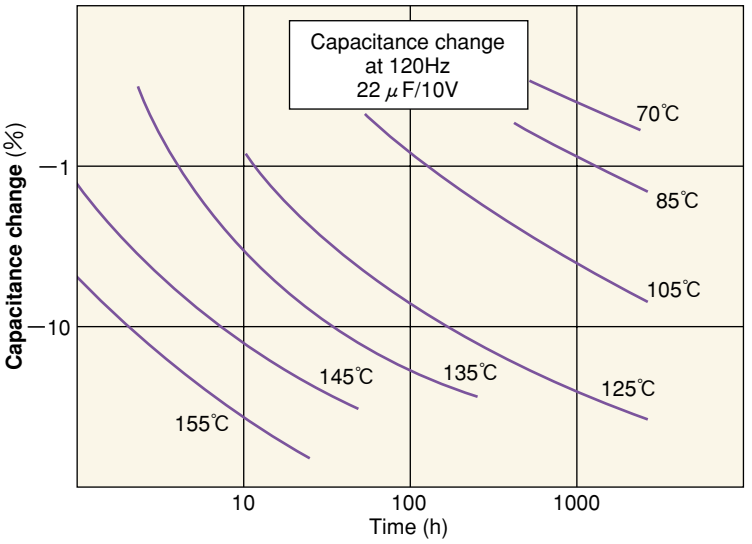


OS-CON (25SVPD10M)
20V bias



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

1. Temperature acceleration test (Endurance)



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

Estimation of life time

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

※Guarantee temperature of **OS-CON** is 105℃, except for SEQP, SVQP and SVPD series.
※The following life time are not guaranteed but presumptive values.

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

2. Reliability presumption of life

The capacitance of **OS-CON** is getting smaller as time goes by on Endurance.
This means wear-failure of **OS-CON** is open mode, which is a main failure factor.
The life time is different by each operating temperature and self-heating by ripple current.
The following formula outline could make it possible to estimate the presumptive lifetime of **OS-CON** at ambient temperature Tx (℃).
The result of the following page estimation is not guaranteed but presumptive values based on actual measurement. The estimated life-span is limited up to 15 years.

2-1. Conductive polymer electrolyte type

$$Lx = Lo \times 10^{\frac{To - Tx}{20}}$$

Lx : Life expectance (h) in actual use (temperature Tx)
Lo : Guaranteed (h) at maximum temperature in use
To : Maximum operating temperature
Tx : Temperature in actual use (ambient temperature of **OS-CON**) (℃)
Please contact us about the presumptive lifetime of **OS-CON** used at the ambient temperature of 125℃ (SVQP,SVPD,SEQP series), when the heat-proof characteristics of sealing rubber have to be factored in.

※The estimated life expectancy of conductive polymer electrolyte type can be calculated without consideration of self-heating under application of the ripple current
※SVPS series: Self-heating temperature by allowance ripple current (℃)

The self-heating temperature under application of the rated ripple current

series	size	Self-heating
SVP,SVPA,SVPC,SVPS※	Except for A5, B6	approx. 20℃
SVP,SVPA,SVPC,SVPS※	A5,B6	approx. 10℃
SVPB,SVPE,SVPF,SEP,SEPC	All	approx. 20℃
SVQP,SEQP,SVPD	All	approx. 2℃

2-2. Organic semiconductive electrolyte type

$$Lx = Lo \times 10^{\frac{To-(Tx+\Delta Tx)}{20}}$$

Lx : Life expectance (h) in actual use (temperature Tx)
Lo : Guaranteed (h) at maximum temperature in use
To : Maximum operating temperature
Tx : Temperature in actual use (ambient temperature of **OS-CON**) (℃)
ΔTx : Self-heating temperature by Ripple current (℃)

$$\Delta Tx = (Ix/Io)^2 \times \Delta T \quad Ix \le Io$$

Io : Allowable ripple current at 45℃ or less (Arms)
Ix : Actual flow of ripple current (Arms)
Note : The value of Ix should be below the value of Io with the coefficient

Ambient temp. (℃)	≤45	45<Tx≤65	65<Tx≤85	85<Tx≤95	95<Tx≤105
Coefficient	1.0	0.85	0.7	0.4	0.25

Self-heating value ΔT by maximum allowable ripple current (45℃ or less) varies according to case size. Refer to the rough values in the chart below :

Case size	A, A'	B, B'	C, C'	D	E, E', E1	F, F', Fo, G, H
ΔT (℃)	8	10	15	16	18	20

3. Factors of short circuit mode

The factors of short circuit are as follows.
(1) Applying voltage over the rated voltage.
(2) Applying reverse voltage
(3) Excessive mechanical stress
(4) Applying an excessive surge current by sudden charge or discharge over the specification.

SANYO

Conductive polymer type / Surface mount type — RoHS compliance

SVPF Series

New

High voltage
High capacitance

This is the high voltage type capacitors of SVPC series.
Please use them in a high voltage line, for example, input of DCDC converter.

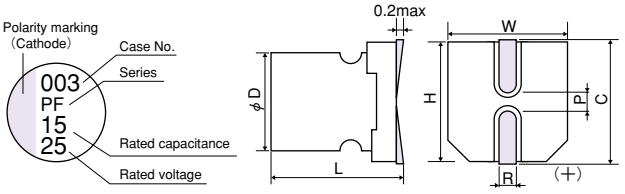
SVPC → SVPF (High voltage, High capacitance)

■ Specifications

Items	Condition		Specifications
Rated voltage (V)	–		25
Surge voltage (V)	Room temperature		29
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% of the initial value
		DF	Within 1.5 times of the initial limit
		ESR	Within 1.5 times of the initial limit
		LC	Within the initial limit
Damp heat(Steady state)	60℃, 90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20% of the initial value
		DF	Within 1.5 times of the initial limit
		ESR	Within 1.5 times of the initial limit
		LC	Within the initial limit (after voltage processing)
Resistance to soldering heat※2	VPS (230℃ X 75s)	△C/C	Within ±10% of the initial value
		DF	Within 1.3 times of the initial limit
		ESR	Within 1.3 times of the initial limit
		LC	Within the initial limit (after voltage processing)

※1 When measured values are questionable, measure after voltage processing mentioned below.
Voltage processing: Apply voltage for 120 minutes at 105℃.
※2 Please refer to page 12 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
C45	6.3	4.4	6.6	6.6	7.3	0.6 to 0.8	2.1
C6	6.3	5.9	6.6	6.6	7.3	0.6 to 0.8	2.1

■ Size list

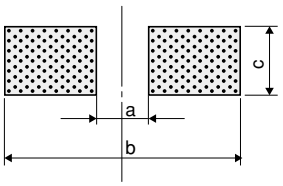
RV : Rated voltage

μF \ RV	25
15	C45
47	C6

■ SVPF 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)	DF (% max)	Leakage current (μA)(max) After 2 minutes
C45	25SVPF15M	25	15	55	1650	12	75
C6	25SVPF47M	25	47	30	2500	12	235

■ Recommended land pattern dimension of PWB



(unit : mm)

Size code	a	b	c
C45	2.1	9.1	1.6
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

Conductive polymer type / Surface mount type — RoHS compliance

SVPE Series

Super low ESR
High 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

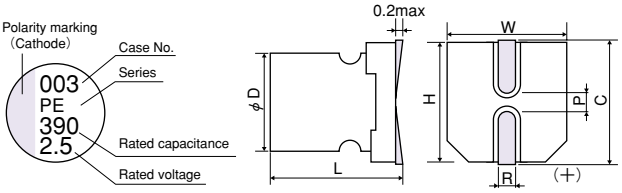
SVPC → SVPE (Super low ESR, High capacitance)

■ Specifications

Items	Condition		Specifications		
Rated voltage (V)	–		2.5	6.3	16
Surge voltage (V)	Room temperature		3.3	8.2	18
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% of the initial value		
		DF	Within 1.5 times of the initial limit		
		ESR	Within 1.5 times of the initial limit		
		LC	Within the initial limit		
Damp heat(Steady state)	60℃, 90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20% of the initial value		
		DF	Within 1.5 times of the initial limit		
		ESR	Within 1.5 times of the initial limit		
		LC	Within the initial limit (after voltage processing)		
Resistance to soldering heat※2	VPS (230℃ X 75s)	△C/C	Within ±10% of the initial value (±15% for 2.5V)		
		DF	Within 1.3 times of the initial limit		
		ESR	Within 1.3 times of the initial limit		
		LC	Within the initial limit (after voltage processing)		

※1 When measured values are questionable, measure after voltage processing mentioned below.
Voltage processing: Apply voltage for 120 minutes at 105℃.
※2 Please refer to page 12 for reflow soldering conditions.

■ Marking and dimensions



(unit : mm)

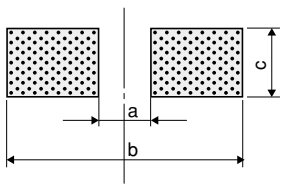
Size code	φD ±0.5	L +0.1 −0.4	W ±0.2	H ±0.2	C ±0.2	R	P ±0.2
B6	5.0	5.9	5.3	5.3	6.0	0.6 to 0.8	1.4
C6	6.3	5.9	6.6	6.6	7.3	0.6 to 0.8	2.1
C45	6.3	4.4	6.6	6.6	7.3	0.6 to 0.8	2.1
F12	10.0	12.6	10.3	10.3	11.0	0.8 to 1.1	4.6

■ SVPE series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR (mΩ) (max) 100kHz/20℃	ESR (mΩ) (max) 300kHz/20℃※1	Rated ripple current 100kHz (mArms) at 105℃	DF (% max)	Leakage current (μA)(max) After 2 minutes
B6	6SVPE180M	6.3	180	15	13	3150	12	500
	6SVPE150M	6.3	150	12	10	3520	12	500
	2R5SVPE330M	2.5	330	15	13	3150	12	500
	2R5SVPE270M	2.5	270	10	9	3860	12	500
C45	2R5SVPE330MX	2.5	330	16	15	3180	12	500
	6SVPE220MX	6.3	220	18	17	3000	12	500
C6	2R5SVPE390M	2.5	390	10	9	3900	12	500
	6SVPE220M	6.3	220	10	9	3900	12	500
F12	16SVPE470M	16	470	10	9	6100	12	1504

※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
C45	2.1	9.1	1.6
C6	2.1	9.1	1.6
F12	4.3	13.1	1.9

■ Size list

μF \ RV	2.5	6.3	16
150		B6	
180		B6	
220		C45,C6	
270	B6		
330	B6,C45		
390	C6		
470			F12

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

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

SVP (Standard) → SVPS Long life

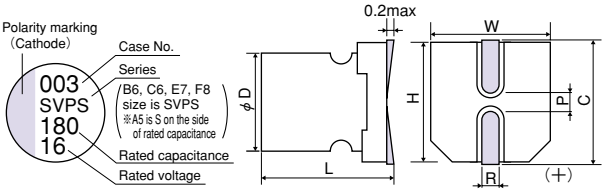
■ Specifications

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	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% of the initial value					
		DF	Within 1.5 times of the initial limit					
		ESR	Within 1.5 times of the initial limit					
		LC	Within the initial limit					
Damp heat(Steady state)	60℃, 90 to 95% RH, 1,000h, No-applied voltage	△C/C	Within ±20% of the initial value					
		DF	Within 1.5 times of the initial limit					
		ESR	Within 1.5 times of the initial limit					
		LC	Within the initial limit (after voltage processing)					
Resistance to soldering heat※2	VPS (230℃ X 75s)	△C/C	Within ±10% of the initial value					
		DF	Within 1.3 times of the initial limit					
		ESR	Within 1.3 times of the initial limit					
		LC	Within the initial limit (after voltage processing)					

※1 When measured values are questionable, measure after voltage processing mentioned below.
Voltage processing: Apply voltage for 120 minutes at 105℃. The voltage to be applied is the rated voltage for 4.0-20V products, and 20V for 25V products.
※2 Please refer to page 12 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

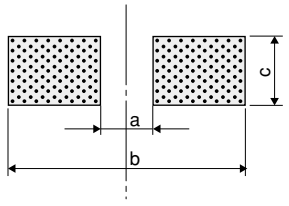
μF \ RV	4.0	6.3	10	16	20	25
10			A5			E7
15			A5			
22		A5		B6	C6	
33	A5		B6			
39				C6		
47		B6			E7	
68	B6		C6			
82				E7		
100				F8		
120		C6				
150	C6		E7、F8			
180				F8		
220		E7				
270	E7					
330			F8			
470		F8				
680	F8					

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

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

■ Recommended land pattern dimension of PWB



(unit : mm)

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

Frequency coefficient for ripple current

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

SANYO

Conductive polymer type / Surface mount type — RoHS compliance

SVPD Series

Guaranteed at 125℃ · Rated 35V max.

85℃ 85% guaranteed

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

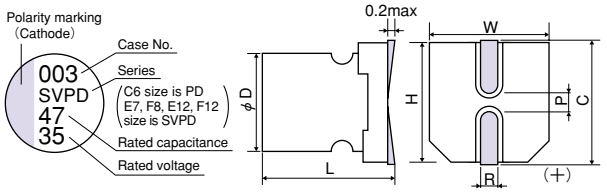
SVQP → SVPD High voltage

■ Specifications

Items	Condition		Specifications			
Rated voltage (V)	–		10	16	25	35
Surge voltage (V)	125℃		12	18	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% of the initial value			
		DF	Within 2 times of the initial limit			
		ESR	Within 2 times of the initial limit			
		LC	Within the initial limit			
Damp heat(Steady state)	85℃, 85 to 95%RH, 1,000h, Rated voltage applied	△C/C	Within ±20% of the initial value			
		DF	Within 2 times of the initial limit			
		ESR	Within 2 times of the initial limit			
		LC	Within the initial limit			
Resistance to soldering heat※2	VPS (230℃ X 75s)	△C/C	Within ±10% of the initial value			
		DF	Within 1.3 times of the initial limit			
		ESR	Within 1.3 times of the initial limit			
		LC	Within the initial limit (after voltage processing)			

※1 In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 125℃.
※2 Please refer to page 12 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

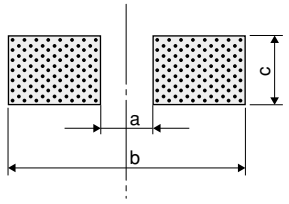
μF \ RV	10	16	25	35
8.2				E7
10			C6	
18				F8
22			E7	E12
39			F8	
47			E12	F12
56	C6			
82		E7	F12	

■ 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℃	DF (% 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

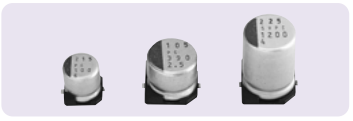
Frequency coefficient for ripple current

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

SANYO

Conductive polymer type / Surface mount type — RoHS compliance

SVPC Series



High 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

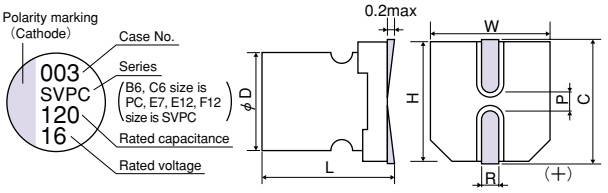
SVPA → SVPC High capacitance

■ 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
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% of the initial value				
		DF	Within 1.5 times of the initial limit				
		ESR	Within 1.5 times of the initial limit				
		LC	Within the initial limit				
Damp heat(Steady state)	60℃, 90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20% of the initial value				
		DF	Within 1.5 times of the initial limit				
		ESR	Within 1.5 times of the initial limit				
		LC	Within the initial limit (after voltage processing)				
Resistance to soldering heat※2	VPS (230℃ X 75s)	△C/C	Within ±10% of the initial value (±15% for 2.5V 4.0V)				
		DF	Within 1.3 times of the initial limit				
		ESR	Within 1.3 times of the initial limit				
		LC	Within the initial limit (after voltage processing)				

※1 In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 105℃.
※2 Please refer to page 12 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		
1,200		E12			
1,500	E12	E12			
2,700	F12				

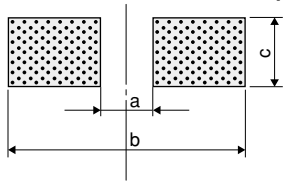
■ SVPC series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR (mΩ) (max)		Rated ripple current 100kHz (mArms) at 105℃	DF (% max)	Leakage current (μA)(max) After 2 minutes
				100kHz/20℃	300kHz/20℃※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

SANYO

Conductive polymer type / Surface mount type — RoHS compliance

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

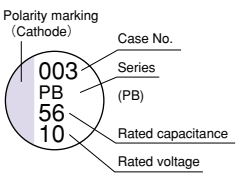
SVPA → SVPB Low profile

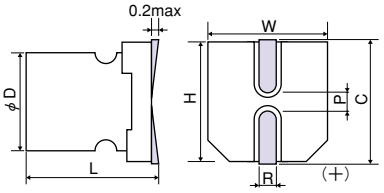
■ Specifications

Items	Condition		Specifications					
Rated voltage (V)	–		2.5	4.0	6.3	10	16	20
Surge voltage (V)	Room temperature		3.3	5.2	8.2	12	18	23
Category temperature range (℃)	–		−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% of the initial value(±30% for C5 size)					
		DF	Within 1.5 times of the initial limit					
		ESR	Within 1.5 times of the initial limit					
		LC	Within the initial limit					
Damp heat(Steady state)	60℃, 90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20% of the initial value					
		DF	Within 1.5 times of the initial limit					
		ESR	Within 1.5 times of the initial limit					
		LC	Within the initial limit (after voltage processing)					
Resistance to soldering heat※2	VPS (230℃ X 75s)	△C/C	Within ±10% of the initial value (±20% for C5 size)					
		DF	Within 1.3 times of the initial limit					
		ESR	Within 1.3 times of the initial limit					
		LC	Within the initial limit (after voltage processing)					

※1 In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 125℃.
※2 Please refer to page 12 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

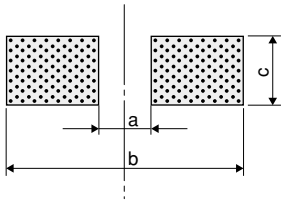
μF \ RV	2.5	4.0	6.3	10	16	20
15						C5
22						C55
33					C5	
56				C5		
82			C5			
100		C5				
120	C5					

■ SVPB series characteristics list

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

●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

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

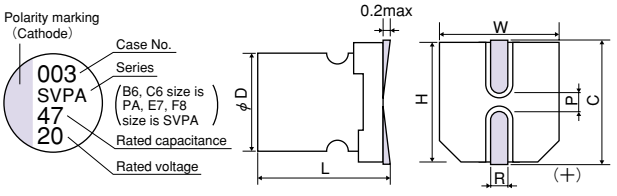
SVP (Standard) → SVPA Low ESR Large ripple current

■ Specifications

Items	Condition		Specifications					
Rated voltage (V)	–		2.5	4.0	6.3	10	16	20
Surge voltage (V)	Room temperature		3.3	5.2	8.2	12	18	23
Category temperature range (℃)	–		−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% of the initial value					
		DF	Within 1.5 times of the initial limit					
		ESR	Within 1.5 times of the initial limit					
		LC	Within the initial limit					
Damp heat(Steady state)	60℃, 90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20% of the initial value					
		DF	Within 1.5 times of the initial limit					
		ESR	Within 1.5 times of the initial limit					
		LC	Within the initial limit (after voltage processing)					
Resistance to soldering heat※2	VPS (230℃ X 75s)	△C/C	Within ±10% of the initial value					
		DF	Within 1.3 times of the initial limit					
		ESR	Within 1.3 times of the initial limit					
		LC	Within the initial limit (after voltage processing)					

※1 In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 105℃.
※2 Please refer to page 12 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
F8	10.0	7.9	10.3	10.3	11.0	0.6 to 0.8	4.6

■ Size list

RV : Rated voltage

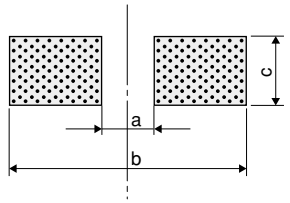
μF \ RV	2.5	4.0	6.3	10	16	20
10						B6
22						C6
39					C6	
47			B6			E7
68		B6		C6		
82	B6				E7	
120			C6			
150		C6		E7		
180	C6				F8	
220			E7			
270		E7				
330	E7			F8		
470			F8			
680		F8				
820	F8					

■ SVPA series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR (mΩ) (max)		Rated ripple current 100kHz (mArms) at 105℃	DF (% max)	Leakage current (μA)(max) After 2 minutes
				100kHz/20℃	300kHz/20℃※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

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

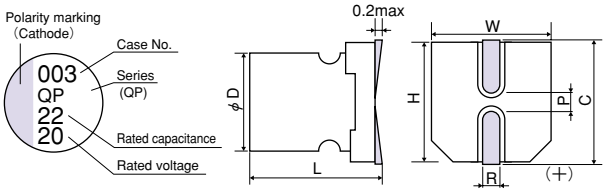
SVP (Standard) → SVQP High reliability

■ 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	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% of the initial value				
		DF	Within 2 times of the initial limit				
		ESR	Within 2 times of the initial limit				
		LC	Within the initial limit				
Damp heat(Steady state)	60℃, 90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20% of the initial value				
		DF	Within 1.5 times of the initial limit				
		ESR	Within 1.5 times of the initial limit				
		LC	Within the initial limit (after voltage processing)				
Resistance to soldering heat※2	VPS (230℃ X 75s)	△C/C	Within ±10% of the initial value				
		DF	Within 1.3 times of the initial limit				
		ESR	Within 1.3 times of the initial limit				
		LC	Within the initial limit (after voltage processing)				

※1 In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 125℃.
※2 Please refer to page 12 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

■ Size list

RV : Rated voltage

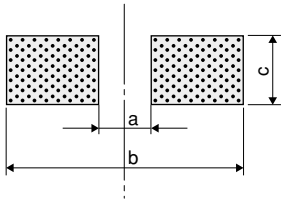
μF \ RV	4.0	6.3	10	16	20
22					C6
39				C6	
47					E7
56			C6		
82		C6		E7	
100		C6			
120			E7		
150	C6		E7		
220		E7			

■ SVQP series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20℃	Rated ripple current 100kHz (mArms)※1 105℃<Tx≤125℃	Allowable ripple current 100kHz (mArms)※1 Tx≤105℃	DF (% 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

SANYO

Conductive polymer type / Surface mount type — RoHS compliance

SVP Series

Standard

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

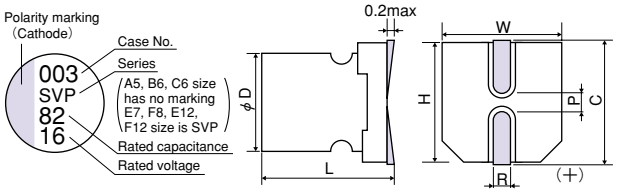
SVPA Low ESR Large ripple current ← SVP (Standard) → SVPS Long life
SVP (Standard) → SVQP High reliability

■ 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	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% of the initial value						
			DF	Within 1.5 times of the initial limit						
			ESR	Within 1.5 times of the initial limit						
			LC	Within the initial limit						
Damp heat(Steady state)		60℃, 90 to 95%RH, 1,000h, No applied voltage	△C/C	Within ±20% of the initial value						
			DF	Within 1.5 times of the initial limit						
			ESR	Within 1.5 times of the initial limit						
			LC	Within the initial limit (after voltage processing)						
Resistance to soldering heat※2		VPS (230℃ X 75s)	△C/C	Within ±10% of the initial value						
			DF	Within 1.3 times of the initial limit						
			ESR	Within 1.3 times of the initial limit						
			LC	Within the initial limit (after voltage processing)						

※1 In case of some problems for measured values, measure after applying rated voltage for 2.5 to 20V products or 20V for 25V products for 120 minutes at 105℃.
※2 Please refer to page 12 for reflow soldering conditions.

■ Marking and dimensions



(unit : mm)

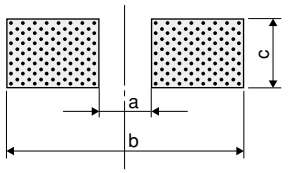
Size code	φD ±0.5	L +0.1 −0.4	W ±0.2	H ±0.2	C ±0.2	R	P ±0.2
A5	4.0	5.4	4.3	4.3	5.0	0.6 to 0.8	1.0
B6	5.0	5.9	5.3	5.3	6.0	0.6 to 0.8	1.4
C6	6.3	5.9	6.6	6.6	7.3	0.6 to 0.8	2.1
E7	8.0	6.9	8.3	8.3	9.0	0.6 to 0.8	3.2
F8	10.0	7.9	10.3	10.3	11.0	0.6 to 0.8	4.6
E12	8.0	11.9	8.3	8.3	9.0	0.8 to 1.1	3.2
F12	10.0	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				
1,200		F12					
1,500	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℃	Rated ripple current 100kHz (mArms) at 105℃	DF (% 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.

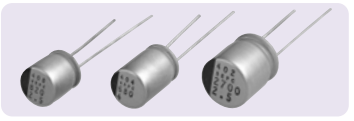
Frequency coefficient for ripple current

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

SANYO

Conductive polymer type / Radial lead type — RoHS compliance

SEPC Series



Small size ¥ Low profile

Super low ESR ¥ High 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.

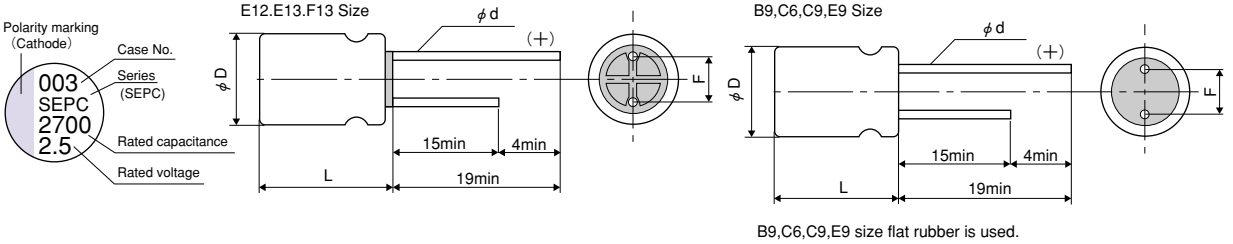
SEP (Standard) → SEPC Super low ESR High capacitance

■ 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
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% of the initial value			
		DF	Within 1.5 times of the initial limit			
		ESR	Within 1.5 times of the initial limit			
		LC	Within the initial limit			
Damp heat(Steady state)	60℃, 90%RH, 1,000h, No-applied voltage	△C/C	Within ±20% of the initial value			
		DF	Within 1.5 times of the initial limit			
		ESR	Within 1.5 times of the initial limit			
		LC	Within the initial limit (after voltage processing)			
Resistance to soldering heat	Flow method (260±5℃ X 10s)	△C/C	Within ±5% of the initial value			
		DF	Within the initial limit			
		ESR	Within the initial limit			
		LC	Within the initial limit (after voltage processing)			

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

■ 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				E9,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		
1,000	E9			
1,500			F13	
2,700	F13			

(unit : mm)

Size code	φD ±0.5	L max	F	φd ±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℃	Rated ripple current 100kHz (mArms) at 105℃	DF (% max)	Leakage current (μA)(max) After 2 minutes
B9	2SEPC100MZ	2.5	100	7	4180	10	500
	2SEPC330MZ	2.5	330	7	4180	10	500
	2SEPC470MZ	2.5	470	7	4180	10	500
	2SEPC560MZ	2.5	560	7	4180	10	500
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
	16SEPC270MX	16	270	10	5000	10	864
	6SEPC470MX	6.3	470	8	5700	10	592
	6SEPC560MX	6.3	560	7	6100	10	705
	4SEPC560MX	4.0	560	7	6100	10	500
	2SEPC560MX	2.5	560	8	4700	10	280
	2SEPC820MX	2.5	820	7	6100	10	500
	2SEPC820MY	2.5	820	5	7200	10	500
	2SEPC1000MX	2.5	1000	7	6100	10	500
E12	16SEPC180M	16	180	16	4360	10	576
	16SEPC270M	16	270	11	5000	10	864
E13	6SEPC470M	6.3	470	8	5700	10	592
	4SEPC560M	4.0	560	7	6100	10	500
	4SEPC680M	4.0	680	7	6100	10	544
	2R5SEPC820M	2.5	820	7	6100	10	500
F13	16SEPC470M	16	470	10	6100	10	1504
	6SEPC680M	6.3	680	7	6640	10	857
	6SEPC1500M	6.3	1500	10	5560	10	1890
	4SEPC820M	4.0	820	7	6640	10	656
	2SEPC2700M	2.5	2700	10	5560	10	1350

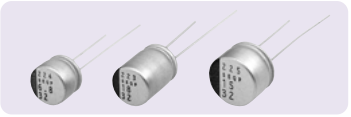
Frequency coefficient for ripple current

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

SANYO

Conductive polymer type / Radial lead type — RoHS compliance

SEQP Series



105℃ 5,000h・High voltage
Guaranteed at 125℃

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. It guarantees 5,000h at 105℃. Lead free-flow is supported.

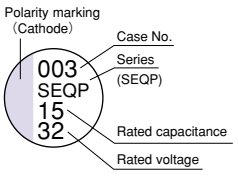
SEP (Standard) → SEQP High reliability High voltage

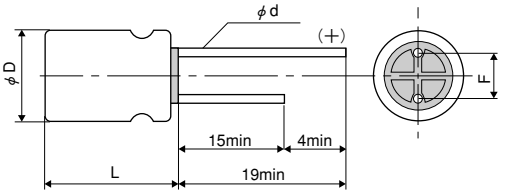
■ Specifications

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	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, 105℃, 5,000h, Rated voltage applied	△C/C	Within ±20% of the initial value					
		DF	Within 2 times of the initial limit					
		ESR	Within 2 times of the initial limit					
		LC	Within the initial limit					
Damp heat(Steady state)	60℃, 90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20% of the initial value					
		DF	Within 1.5 times of the initial limit					
		ESR	Within 1.5 times of the initial limit					
		LC	Within the initial limit (after voltage processing)					
Resistance to soldering heat	Flow method (260±5℃ X 10s)	△C/C	Within ±5% of the initial value					
		DF	Within the initial limit					
		ESR	Within the initial limit					
		LC	Within the initial limit (after voltage processing)					

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

■ Marking and dimensions





(unit : mm)

Size code	φD ±0.5	L max	F	φd ±0.05
C6	6.3	6.0	2.5 ±0.5	0.45
E7	8.0	7.0	3.5 ±0.5	0.45
F8	10.0	8.0	5.0±0.5	0.50
E12	8.0	12.0	3.5±0.5	0.60
F13	10.0	13.0	5.0±0.5	0.60

■ Size list

RV : Rated voltage

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				
1,200	F13					

■ SEQP 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℃	DF (% 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

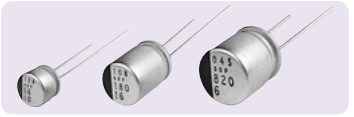
Frequency coefficient for ripple current

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

SANYO

Conductive polymer type / Radial lead type — RoHS compliance

SEP Series



Standard

Guaranteed at 105℃ 3,000h

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

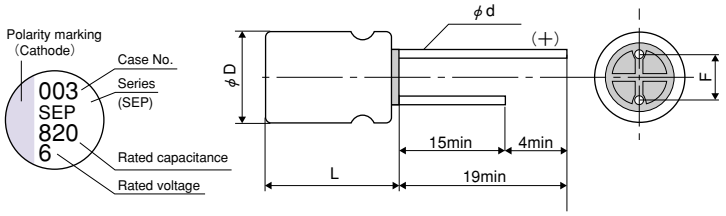
SEPC (Super low ESR High capacitance) ← SEP (Standard) → SEQP (High reliability High voltage)

■ 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 / 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% of the initial value
		DF	Within 1.5 times of the initial limit
		ESR	Within 1.5 times of the initial limit
		LC	Within the initial limit
Damp heat(Steady state)	60℃, 90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20% of the initial value
		DF	Within 1.5 times of the initial limit
		ESR	Within 1.5 times of the initial limit
		LC	Within the initial limit (after voltage processing)
Resistance to soldering heat	Flow method (260±5℃ X 10s)	△C/C	Within ±5% of the initial value
		DF	Within the initial limit
		ESR	Within the initial limit
		LC	Within the initial limit (after voltage processing)

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

■ Marking and dimensions



(unit : mm)

Size code	φD ±0.5	L max	F	φd ±0.05
C6	6.3	6.0	2.5 ±0.5	0.45
E7	8.0	7.0	3.5 ±0.5	0.45
F8	10.0	8.0	5.0 ±0.5	0.50
E12	8.0	12.0	3.5 ±0.5	0.60
F13	10.0	13.0	5.0 ±0.5	0.60

■ Size list

RV : Rated voltage

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				
1,200		F13					
1,500	F13						

■ SEP 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) at 105℃	DF (% 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

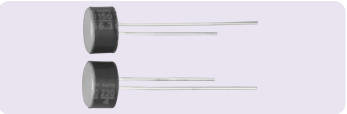
※1 The surge voltage of 25V products is 25V. Please consider SVPD series 25V products (whose surge voltage is 29V) in placing a new order.

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

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.

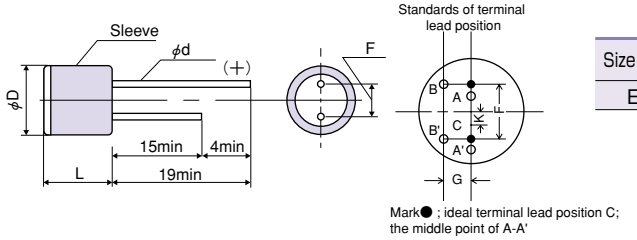
SP → SF Low profile

■ 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% of the initial value	
		DF	Within 1.5 times of the initial limit	
		LC	Within the initial limit	
Damp heat(Steady state)	60℃, 90 to 95%RH, No-applied voltage 500h,	△C/C	Within ±20% of the initial value	
		DF	Within 2 times of the initial limit	
		LC	Within the initial limit	
Resistance to soldering heat	Flow method (260±5℃ X 10s)	△C/C	Within ±5% of the initial value	
		DF	Within 1.5 times of the initial limit	
		LC	Within the initial limit (after voltage processing)	

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

■ Dimensions



(unit : mm)

Size code	φD +0.5max	L max	F	φd ±0.05	G max	K max
E1	8.0	5.0	3.5 ±0.5	0.6	0.8	0.8

■ 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℃	Allowable ripple current (mArms)※1	DF (% 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℃

Temperature coefficient for allowable ripple current

Ambient temp.	Tx ≤ 45℃	45℃ < Tx ≤ 65℃	65℃ < Tx ≤ 85℃	85℃ < Tx ≤ 95℃	95℃ < Tx ≤ 105℃
Coefficient	1	0.85	0.7	0.4	0.25

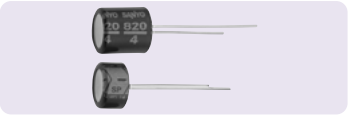
Frequency coefficient for allowable ripple current

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

SANYO

Organic semiconductive electrolyte type / Radial lead type **RoHS compliance**

SP Series



High capacitance ¥ Low ESR

Optimum for Audio etc.

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

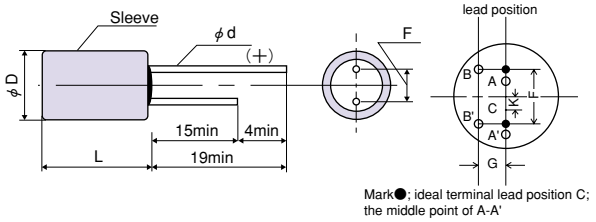
SC (Standard) → SP High capacitance Low ESR

■ Specifications

Items	Condition		Specifications							
Rated voltage (V)	–		2.0	2.5	4.0	6.3	10	16	20	25
Surge voltage (V)	Room temperature		2.6	3.3	5.2	8.2	11.5	18.4	23	25
Category temperature range (℃)	–		−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% of the initial value							
		DF	Within 1.5 times of the initial limit							
		LC	Within the initial limit							
Damp heat(Steady state)	60℃, 90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20% of the initial value							
		DF	Within 2 times of the initial limit							
		LC	Within the initial limit							
Resistance to soldering heat	Flow method (260±5℃ X 10s)	△C/C	Within ±5% of the initial value							
		DF	Within 1.5 times of the initial limit							
		LC	Within the initial limit (after voltage processing)							

※1 Please reduce 0.25V per 1℃ 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	L max	F	φd ±0.05	G max	K max
C'	6.3	6.0	2.5 ±0.5	0.60	0.5	0.5
E'	8.0	6.0	3.5 ±0.5	0.60	0.8	0.8
F'	10.0	6.0	5.0 ±0.5	0.60	0.8	0.8
C	6.3	7.8	2.5 ±0.5	0.60	0.5	0.5
D	6.3	10.8	2.5 ±0.5	0.60	0.5	0.5
E	8.0	11.5	3.5 ±0.5	0.60	0.8	0.8
F	10.0	11.5	5.0 ±0.5	0.60	0.8	0.8
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					
1,000	F		F					
1,200		F						
1,500			F0					
1,800	F0							
2,200			G					

■ SP series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20℃	Allowable ripple current (mArms)※1	DF (% 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
Fo	4SP1500M	4.0	1500	8	6500	10	600
	2SP1800M	2.0	1800	8	6500	10	720
G	4SP2200M	4.0	2200	9	7100	12	880

※1 100kHz, +45℃ ※2 D size is indicated to SPS series.

Temperature coefficient for allowable ripple current

Ambient temp.	Tx ≤ 45℃	45℃ < Tx ≤ 65℃	65℃ < Tx ≤ 85℃	85℃ < Tx ≤ 95℃	95℃ < Tx ≤ 105℃
Coefficient	1	0.85	0.7	0.4	0.25

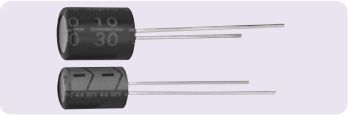
Frequency coefficient for allowable ripple current

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

SANYO

Organic semiconductive electrolyte type / Radial lead type **RoHS compliance**

SC Series



Standard

SH Long life
SA High capacitance Small size
SC (Standard)
SP High capacitance Low ESR
SL Low profile
SS Small size

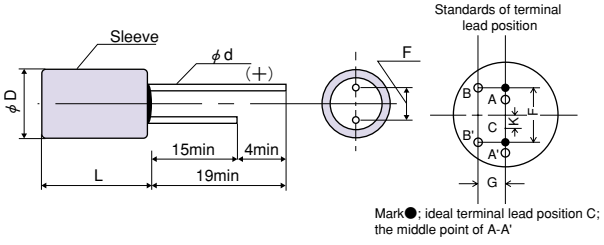
Suitable for noise limiters and switching power supplies that make a point of high frequency characteristics.
Also, make use of it when needed long life span and high reliability.
Lead free-flow is supported.

■ Specifications

Items	Condition		Specifications				
Rated voltage (V)	–		6.3	10	16	25	30
Surge voltage (V)	Room temperature		7.2	11.5	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% of the initial value				
		DF	Within 1.5 times of the initial limit				
		LC	Within the initial limit				
Damp heat(Steady state)	60℃, 90 to 95%RH, 1,000h, No applied voltage	△C/C	Within ±10% of the initial value				
		DF	Within 1.5 times of the initial limit				
		LC	Within the initial limit				
Resistance to soldering heat	Flow method (260±5℃ X 10s)	△C/C	Within ±5% of the initial value				
		DF	Within the initial limit				
		LC	Within the initial limit (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	L max	F	φd ±0.05	G max	K max
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℃	Allowable ripple current (mArms) ※1	DF (% 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℃

Temperature coefficient for allowable ripple current

Ambient temp.	Tx ≤ 45℃	45℃ < Tx ≤ 65℃	65℃ < Tx ≤ 85℃	85℃ < Tx ≤ 95℃	95℃ < Tx ≤ 105℃
Coefficient	1	0.85	0.7	0.4	0.25

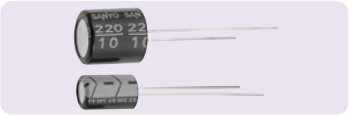
Frequency coefficient for allowable ripple current

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

SANYO

Organic semiconductive electrolyte type / Radial lead type **RoHS compliance**

SA Series



High capacitance
Small size

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

SC (Standard) → SA Small size High capacitance

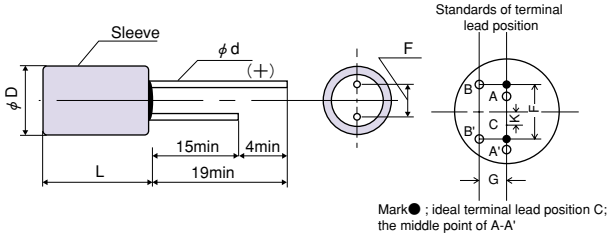
■ Specifications

Items	Condition		Specifications			
Rated voltage (V)	–		6.3	10	16	20
Surge voltage (V)	Room temperature		7.2	11.5	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% of the initial value			
		DF	Within 1.5 times of the initial limit			
		LC	Within the initial limit			
Damp heat(Steady state)	60℃, 90 to 95%RH, 1,000h, No applied voltage	△C/C	Within ±10% of the initial value			
		DF	Within 1.5 times of the initial limit			
		LC	Within the initial limit (after voltage processing)			
Resistance to soldering heat	Flow method (260±5℃ X 10s)	△C/C	Within ±5% of the initial value			
		DF	Within the initial limit			
		LC	Within the initial limit (after voltage processing)			

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

■ Dimensions

(unit : mm)



Size code	φD +0.5max	L max	F	φd ±0.05	G max	K max
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	
1,000			H	
2,200	H			

■ SA series characteristics list

Size code	Part number	Rated voltage (V)	Rated capacitance (μF)	ESR(mΩ) (max) 100kHz to 300kHz/20℃	Allowable ripple current (mArms) ※1	DF (% 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℃

Temperature coefficient for allowable ripple current

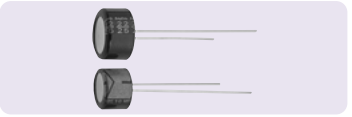
Ambient temp.	Tx ≤ 45℃	45℃ < Tx ≤ 65℃	65℃ < Tx ≤ 85℃	85℃ < Tx ≤ 95℃	95℃ < Tx ≤ 105℃
Coefficient	1	0.85	0.7	0.4	0.25

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

Organic semiconductive electrolyte type / Radial lead type **RoHS compliance**

SL Series



Low profile

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.

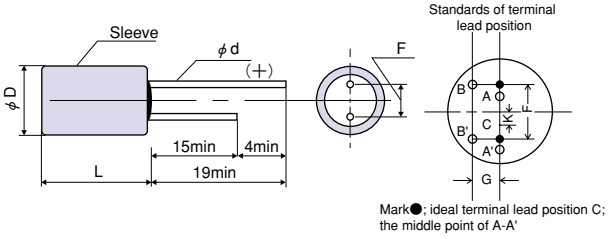
SC (Standard) → SL Low profile

■ Specifications

Items	Condition		Specifications				
Rated voltage (V)	–		4.0	6.3	10	16	25
Surge voltage (V)	Room temperature		4.6	7.2	11.5	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% of the initial value				
		DF	Within 1.5 times of the initial limit				
		LC	Within the initial limit				
Damp heat(Steady state)	60℃, 90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20% of the initial value				
		DF	Within 2 times of the initial limit				
		LC	Within the initial limit (after voltage processing)				
Resistance to soldering heat	Flow method (260±5℃ X 10s)	△C/C	Within ±5% of the initial value				
		DF	Within 1.5 times of the initial limit				
		LC	Within the initial limit (after voltage processing)				

※1 Please reduce 0.25V per 1℃ 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	φD +0.5max	L max	F	φd ±0.05	G max	K max
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℃	Allowable ripple current (mArms) ※1	DF (% 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℃

Temperature coefficient for allowable ripple current

Ambient temp.	Tx ≤ 45℃	45℃ < Tx ≤ 65℃	65℃ < Tx ≤ 85℃	85℃ < Tx ≤ 95℃	95℃ < Tx ≤ 105℃
Coefficient	1	0.85	0.7	0.4	0.25

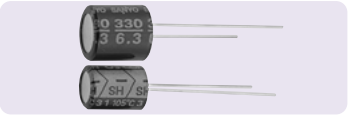
Frequency coefficient for allowable ripple current

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

SANYO

Organic semiconductive electrolyte type / Radial lead type **RoHS compliance**

SH Series



Long life (105℃ 5,000h)

SH series has a long life (guaranteed at105℃ 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.

SC (Standard) → SH Long life

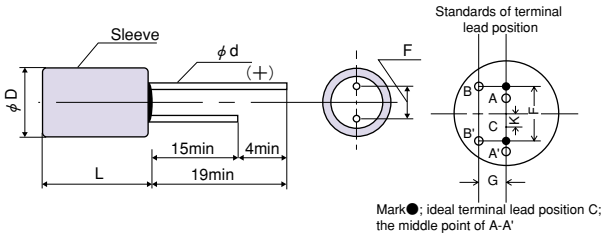
■ Specifications

Items	Condition		Specifications				
Rated voltage (V)	–		6.3	10	16	20	25
Surge voltage (V)	Room temperature		7.2	11.5	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% of the initial value				
		DF	Within 1.5 times of the initial limit				
		LC	Within 5 times of the initial limit				
Damp heat(Steady state)	60℃, 90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±10% of the initial value				
		DF	Within 1.5 times of the initial limit				
		LC	Within the initial limit				
Resistance to soldering heat	Flow method (260±5℃ X 10s)	△C/C	Within ±5% of the initial value				
		DF	Within the initial limit				
		LC	Within the initial limit (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 20V products or temperature derating voltage for 25V products for 30 minutes at 105℃ .

■ Dimensions

(unit : mm)



Size code	φD +0.5max	L max	F	φd ±0.05	G max	K max
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℃	Allowable ripple current (mArms)※1	DF (% 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℃

Temperature coefficient for allowable ripple current

Ambient temp.	Tx ≤ 45℃	45℃ < Tx ≤ 65℃	65℃ < Tx ≤ 85℃	85℃ < Tx ≤ 95℃	95℃ < Tx ≤ 105℃
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

SANYO

Organic semiconductive electrolyte type / Radial lead type **RoHS compliance**

SS Series

Small size 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.

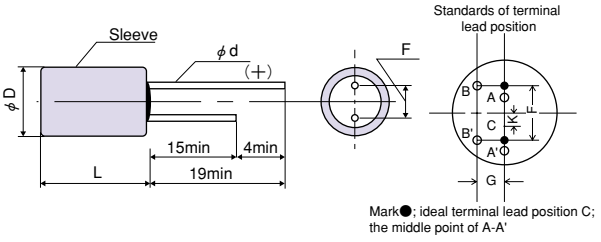
SC (Standard) → SS Small size

■ Specifications

Items	Condition		Specifications				
Rated voltage (V)	–		4.0	6.3	10	16	20
Surge voltage (V)	Room temperature		4.6	7.2	11.5	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% of the initial value				
		DF	Within 1.5 times of the initial limit				
		LC	Within the initial limit				
Damp heat(Steady state)	60℃, 90 to 95%RH, 1,000h, No-applied voltage	△C/C	Within ±20% of the initial value				
		DF	Within 2 times of the initial limit				
		LC	Within the initial limit				
Resistance to soldering heat	Flow method (260±5℃ X 10s)	△C/C	Within ±5% of the initial value				
		DF	Within 1.5 times of the initial limit				
		LC	Within the initial limit (after voltage processing)				

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

■ Dimensions



(unit : mm)

Size code	φD +0.5max	L max	F	φd ±0.05	G max	K max
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℃	Allowable ripple current (mArms) ※1	DF (% 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℃

Temperature coefficient for allowable ripple current

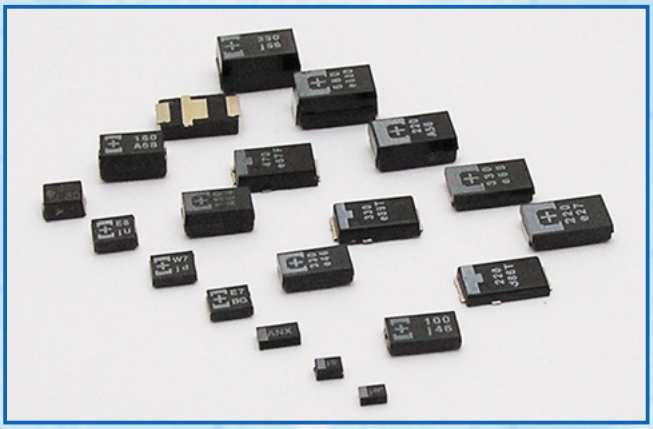
Ambient temp.	Tx ≤ 45℃	45℃ < Tx ≤ 65℃	65℃ < Tx ≤ 85℃	85℃ < Tx ≤ 95℃	95℃ < Tx ≤ 105℃
Coefficient	1	0.85	0.7	0.4	0.25

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

POSCAP

Chip capacitors with various lineup, meeting different needs of electronic equipments



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*

Excellent noise-absorbent characteristics

Excellent temperature characteristics up to −55℃

The rush current is guaranteed for 20A

Superior to Ta-cap in safety

*A part of the model is excluded.

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
Car electronics

Series integration

①Please make note that all models from TPA series as well as the 16V TPB･TPC series are being integrated into the following series.

Discontinued series	Alternative series
TPA	TPB
TPB (16TPB47M,16TPB47ML)	TQC (16TQC47M)
TPC (16TPC33M)	TQC (16TQC33M)

②The following discontinued models are integrated into the following alternative models. Our company continue the supply to the customer who has already used it.

Series	Applicable model	Alternative model
TPB	10TPB100M	10TPB100ML
	8TPB47M	10TPB47M
	8TPB33M	10TPB33M
	6TPB150M	6TPC150M
	6TPB150ML	6TPC150M
	6TPB150MC	6TPE150MPC2
	6TPB100MC	6TPC100MC
	6TPB100MA	6TPE100MAZB
	6TPB100MAV	6TPE100MAZB
	6TPB47M	6TPC47MB
	4TPB680M	4TPE680M
	4TPB470M	4TPE470ML
	4TPB470ML	4TPE470ML
	4TPB220M	4TPE220M
	4TPB220ML	4TPE220M
	4TPB220MC	4TPE220MPC2
	4TPB100M	4TPE100MZB
	4TPB100MV	4TPE100MZB
	2R5TPB1000M	2R5TPE1000M
	2R5TPB680M	2R5TPE680ML
	2R5TPB680ML	2R5TPE680ML
	2R5TPB470ML	2R5TPE470M
	2R5TPB330M	2R5TPE330M
	2R5TPB330ML	2R5TPE330M
	2R5TPB220MA	2R5TPE220MZB
TPC	4TPC220M	4TPE220M
	4TPC150M	4TPE150M
	2R5TPC330M	2R5TPE330M
	2R5TPC220M	2R5TPE220M

Series	Applicable model	Alternative model
TPD	10TPD150M	10TPF150ML
	6TPD330M	6TPF330M9L
	6TPD220M	6TPF220ML
	4TPD470M	4TPF470ML
	4TPD330M	4TPF330ML
	2R5TPD680M	2R5TPF680ML
	2R5TPD680M8	2R5TPF680M7L
	2R5TPD470M	2R5TPF470ML
	2R5TPD470M8	2R5TPF470M7L
TPE	6TPE150MPC	6TPE150MPC2
	4TPE220MPC	4TPE220MPC2
	4TPE220MIC	4TPE220MIC2
	2R5TPE330MPC	2R5TPE330MPC2
	2R5TPE330MIC	2R5TPE330MIC2
	2R5TPE330MFC	2R5TPE330MFC2
TPU	8TPU33MBI	10TPU33MAI
	6TPU47MBI	6TPU47MAI
	4TPU68MBI	4TPU68MAI
	6TPU22MSK	6TPU22MSI
	6TPU10M	6TPU10MSI
	4TPU33MSK	4TPU33MSI
	4TPU15M	4TPU15MSI
	2R5TPU47MSK	2R5TPU47MSI
	2R5TPU22M	2R5TPU22MSI

③The following model are deleted from each of the series characteristics list. Because the models are integrated, the development are discontinued.

Deletion model			
10TPB220MC	4TPG150M	2R5TPL220MC	2TPF470M6
2TPLF470M7	2TPSF270MC	2TPSF270M9	

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 4 to 6)

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℃ 2,000h.
  0.5%/1,000h (Environment temp. : 105℃, Rated voltage or Category voltage applied)
- In the case of the endurance which is 105℃ 1,000h or 125℃ 1,000h.
  1.0%/1,000h (Environment temp. : 105℃, Rated voltage or Category voltage applied)
- In the case of the endurance which is 85℃ 1,000h.
  1.0%/1,000h (Environment temp. : 85℃, 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≤1,000μF	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	
	S09,S11,A09,B09, B1,B1G,B15G, B2, B2S, C, C1, C2, C3, D12T, D15T, D2, D2E, D2T, D3L, D3, D4(THD), D4D	D4
T≤45℃	1.00	1.00
45℃<T≤85℃	0.70	0.50
※85℃<T≤105℃	0.25	0.25

T :Environment temperature
※ THseries :85℃<T≤125℃

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 5. about the general storage conditions)

The storage period is 18 months or shorter after shipment from factories, under the condition that is unopened the storage bag.

Please unseal storage bag just before 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. Moreover, once open the strage bag, it should be followed the table's Floor Life "Time" and "conditions"

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	S09,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.

Series system diagram

POSCAP

P.96 to 97

TPB
Standard

- D4 size — 6.3 to 10V, 220 to 470μF
- D3L size — 4.0 to 10V, 100 to 330μF
- C size — 2.5 to 10V, 47 to 220μF
- B2 size — 2.5 to 10V, 33 to 150μF

P.98 to 99

TPC
Low profile

- D2 size — 6.3 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.91

TPG
Small size
High capacitance

- B15G size — 4.0 to 6.3V, 150 to 220μF
- B1G size — 2.5 to 12.5V, 33 to 220μF

P.92 to 95

TPE
Low ESR

- D4 size — 2.5 to 10V, 330 to 1,500μF
- D3L size — 2.5 to 10V, 220 to 680μF
- D2E size — 2.0 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 — 2.0 to 10V, 47 to 330μF

P.100

TPD
Low ESR
High capacitance

- D4D size — 2.5 to 6.3V, 470 to 1,000μF

P.88 to 89

TPL
Low ESR · Low ESL
Face down terminal type

- D2T size — 2.0 to 2.5V, 330 to 470μF
- D15T size — 2.5V to 6.3V, 150 to 330μF
- D12T size — 2.0 to 6.3V, 100 to 220μF

P.88 to 89

TPLF
Low ESR · Low ESL
Face down terminal type

- D2T size — 2.0V, 220 to 560μF

P.90

TPF
Low ESR
High capacitance

- D3L size — 2.5 to 10V, 150 to 680μF
- D2E size — 2.0V, 220 to 330μF

P.86

TPSF
Low ESR
High capacitance
Small size

- B2S size — 2.0V to 10V, 62 to 270μF

Series system diagram

POSCAP

P.87

TPU

Small size · Low profile
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, 33 to 68μF
- S09 size — 2.5 to 10V, 4.7 to 47μF

P.102 to 103

TH

Guaranteed at 125°C

- D4D size — 2.5 to 6.3V, 330 to 680μF
- D4 size — 2.5 to 10V, 220 to 1,000μF
- D3L size — 2.5 to 10V, 100 to 470μF
- D2 size — 2.5 to 10V, 68 to 220μF
- D2E size — 2.5 to 6.3V, 150 to 330μF

P.101

TA

High reliability
(For the car electronics)

- D3L size — 2.5 to 10V, 220 to 680μF
- D2E size — 2.5 to 10V, 68 to 470μF
- B2 size — 4.0 to 10V, 47 to 100μF

P.104

TQC

High voltage

- D3 size — 16V, 100μF
- D3L size — 16 to 25V, 33 to 68μF
- D2 size — 16 to 35V, 10 to 68μF
- C size — 16 to 25V, 10 to 22μF
- B2 size — 16 to 25V, 5.6 to 15μF

The size of each photo is nearly to full scale.

Products list

POSCAP

Case size

(Unit:mm)

	S09	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	0.9	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	4.7	5.6	8.2	10	15	22	33	47	56	62	68	82
2V	TPE												
	TPE												
	TPE												
	TPF												
	TPL												
	TPLF												
	TPSF												
2.5V	TPB												
	TPC									B1 (70)			C1 (70)
	TPD												
	TPE												
	TPE												
	TPE												
	TPE												
	TPF												
	TPG												
	TPL												
	TPL												
	TPU						S09 (250)		S09 (150)			S11 (150)	
4V	TPB												
	TPB											B2 (70)	
	TPC								B1 (70)	C1 (70)			
	TPD												
	TPE												
	TPE												
	TPE												
	TPF												
	TPG												
	TPL												
	TPU					S09 (250)		S09 (150)	S11 (150)			A09 (150)	
6.3V	TPB											B2 (70)	
	TPB												
	TPC							B1 (70)	B1 (70)			C1 (55)	
	TPC												
	TPD												
	TPE												
	TPE												
	TPE												
	TPE												
	TPF												
	TPG											B1G (70)	
	TPL												
	TPU				S09 (250)		S09 (150)	S11 (150)	A09 (150)				
8V	TPB												C (45)
	TPC						B1 (70)	C1 (70)					
	TPE												
	TPG								B1G (70)				
10V	TPB							B2 (70)	C (55)			C (55)	
	TPB								B2 (70)				
	TPC							B1 (70)				D2 (45)	
	TPE								B2 (35)			D2E (25)	
	TPF												
	TPG							B1G (70)	B1G (70)				
	TPU	S09 (500)						A09 (150)					
	TPSF										B2S (18)		
12.5V	TPC				B1 (80)	B1 (80)							
	TPG							B1G (70)					
16V	TQC				B2 (100)		C (80)	D2 (70)	D2 (70)			D2 (50)	
	TQC								D3L (45)			D3L (50)	
20V	TQC			B2 (100)		C (80)	D2 (80)	D2 (45)	D2 (55)				
	TQC								D3L (55)				
25V	TQC		B2 (100)		C (95)	D2 (90,45)	D2 (90,45)	D3L (60)					
35V	TQC				D2 (120)								

Products list

POSCAP

★Under development ∗1(F:15, I:18, M:25) ∗2(C:12, F:15, I:18, M:25) ∗3(7, 9, C:12, F:15, I:18, M:25) ∗4(5, 6, 8, 10)

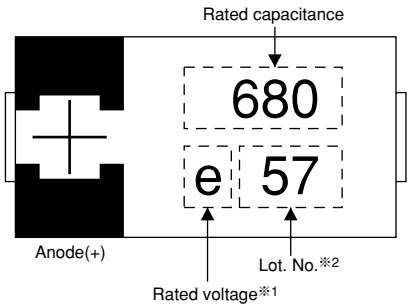
・Symbols in table:Case size
・( ):ESR specification(mΩmax.)

WV	μF / Series	100	120	150	180	220	270	330	470	560	680	1,000	1,500
2V	TPE							B2(18)					
	TPE							B2(15,13)					
	TPE							D2E(9,7,6★)	D2E(9,7,6★)				
	TPF					D2E(6)		D2E(6)					
	TPL					D12T(25)★							
	TPLF					D2T(7,6)		D2T(7,6,5★)	D2T(6,5★)	D2T(6,5)★			
	TPSF						B2S(9)						
2.5V	TPB	B2(70)				C(45)							
	TPC												
	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(12,9,8,7★)	D2T(12,9,8,7★)				
	TPL					D15T(18)		D15T(15)					
	TPU	A09(150)											
4V	TPB			C(45)									
	TPB			B2(70)				D3L(40)					
	TPC	C1(55)											
	TPD										D4D(10)		
	TPE			D2E(25,18)		D2E(∗1)		D2E(25,18)	D3L(∗2)		D4(∗1)		
	TPE	B2(35)		B2(35,30)		B2(35)							
	TPE					C2(25,18,15)							
	TPF							D3L(12)	D3L(10)				
	TPG					B15G(70)							
	TPL			D12T(25)★		D15T(20)							
	TPU												
6.3V	TPB					D3L(40)		D3L(40)					
	TPB							D4(40)	D4(35)				
	TPC	C1(55)											
	TPC	D2(45)		D2(40)				D2(40)					
	TPD								D4D(10)				
	TPE	D2E(25,18)		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(35,25)	B2(35)	B2(35,25)		B2(35)							
	TPF					D3L(12)		D3L(9)					
	TPG	B1G(70,55)		B15G(70)									
	TPL	D12T(25)★		D15T(25)		D15T(25)★							
	TPU			B09(100)									
8V	TPB												
	TPC			D2(40)									
	TPE	C2(25)											
	TPG												
10V	TPB					D4(40)		D4(35)					
	TPB	D3L(55)		D3L(40)		D3L(40)							
	TPC	D2(45)											
	TPE			C3(55)	C3(55)	D3L(25,18★)		D4(25)					
	TPF			D3L(15)									
	TPG												
	TPU												
	TPSF												
12.5V	TPC												
	TPG												
16V	TQC	D3(50)											
	TQC												
20V	TQC												
	TQC												
25V	TQC												
30V	TQC												

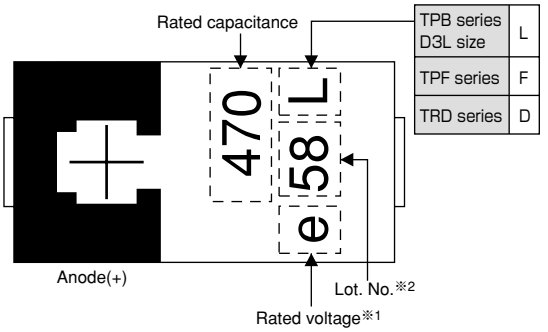
Marking

POSCAP

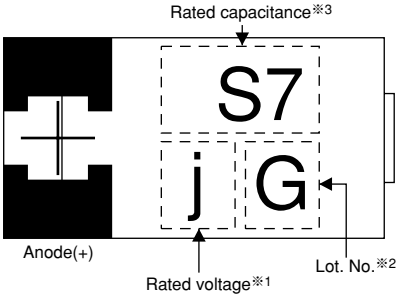
●C,C1,D2,D4 size (TPB,TPC,TH series) ●C,D2,D3,D3L size (TQC series)



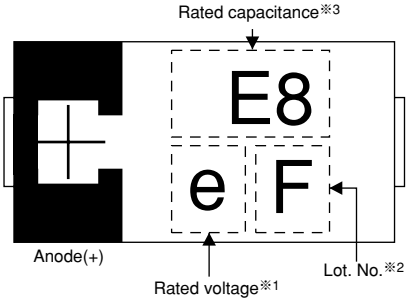
●C2,C3,D2E,D3L size (TPB,TPE,TPF series) ●D4,D4D size (TPD,TPE series)



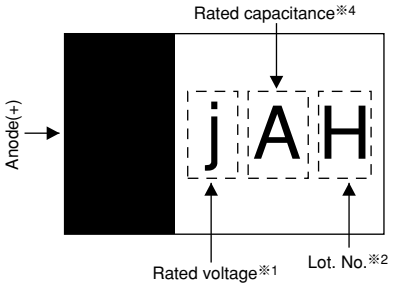
●B09,B1,B1G,B15G,B2 size (TPB,TPG,TPU,TQC series)



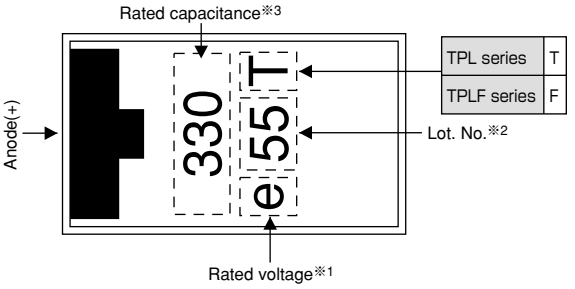
●B2 size (TPE series)



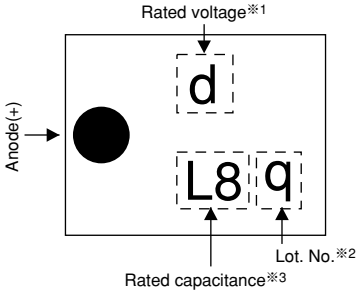
●S09,S11,A09 size (TPU series)



●D2T,D15T,D12T size (TPL,TPLF series)



●B2S size (TPSF 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.(S09,S11,A09)

R. Cap. (μF)	4.7	10	15	22	33	47	68	100
Mark	s	A	E	J	N	S	W	A

Explanation of part numbers

POSCAP

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
35	35

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
4.7	4R7
5.6	5R6
8.2	8R2
10	10
15	15
22	22
33	33
47	47
56	56
62	62
68	68
82	82
100	100
150	150
220	220
270	270
330	330
470	470
680	680
1,000	1,000
1,500	1,500

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℃	AZB
	ESR 30mΩ max 85℃	AUB
	ESR 25mΩ max 85℃	APB
	ESR 15mΩ max 85℃	AFB
	ESR 15mΩ/300kHz max 85℃	AFGB
	ESR 13mΩ/300kHz max 85℃	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℃	AP
D3L size	ESR 25mΩ max	L
	ESR 18mΩ max	IL
	ESR 15mΩ max	FL
	ESR 12mΩ max	CL

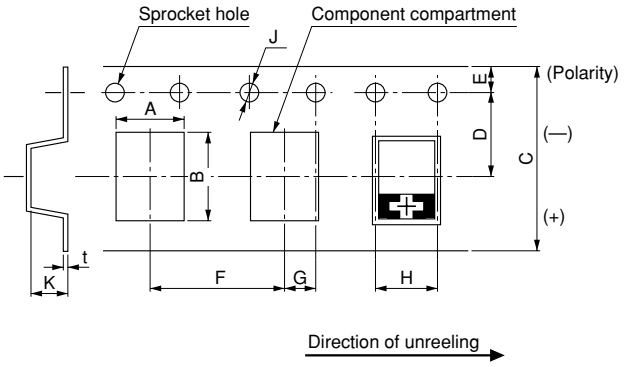
Standard		Code
TPB series		
B2 size	85℃	A
	ESR 45mΩ max	V
	ESR 45mΩ max 85℃	AV
C size		C
D3L size		L
TPC series		
B1 size		B
C1 size		C
TPF series		
D3L size	ESR 9mΩ max	9L
	ESR 7mΩ max	7L
	ESR 6mΩ max	6L
TPL series		
D12T size		D
D15T size	ESR 25mΩ max	U
	ESR 20mΩ max	KU
	ESR 18mΩ max	IU
	ESR 15mΩ max	FU
TPU series		
S09 size		SI
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
ESR 9mΩ/300kHz max		9G
ESR 6mΩ/500kHz max		6E

Packing specifications

POSCAP

*We supply only embossed taping type.

Dimension of carrier tape

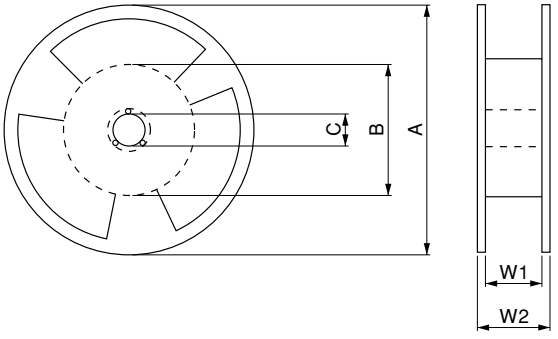


(unit:mm)

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
S09	1.65	2.4	8.0	3.5	1.75	4.0	2.0	4.0	φ1.5	1.3	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

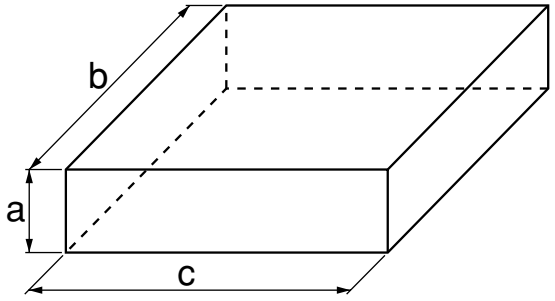
Packing specifications

POSCAP

Packing quantities

Size code	Pieces/reel (φ180)	Pieces/reel (φ330)	Size code	Pieces/reel (φ180)	Pieces/reel (φ330)
S09	3,000	–	C3	–	2,500
S11	3,000	–	C	–	2,500
A09	3,000	–	D2E	–	3,000
B09	3,000	–	D2T	–	3,000
B1	3,000	–	D15T	–	4,000
B1G	2,500	–	D12T	–	4,000
B15G	2,500	–	D2	–	3,000
B2	2,000	–	D3L	–	2,500
B2S	2,000	–	D3	–	2,500
C1	–	4,000	D4	–	2,000
C2	–	3,000	D4D	–	2,000

Dimension of packing case



(unit:mm)

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

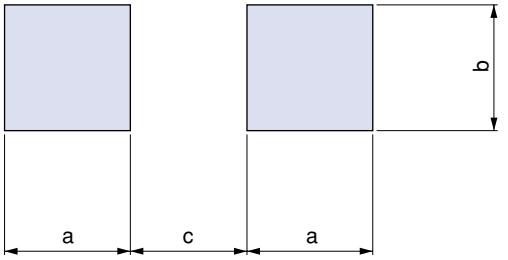
Units per packing case

Size code	Pieces/case	Size code	Pieces/case
S09	15,000	C3	12,500
S11	15,000	C	12,500
A09	15,000	D2E	15,000
B09	15,000	D2T	15,000
B1	15,000	D15T	20,000
B1G	12,500	D12T	20,000
B15G	12,500	D2	15,000
B2	10,000	D3L	12,500
B2S	10,000	D3	12,500
C1	20,000	D4	10,000
C2	15,000	D4D	10,000

Recommended land pattern dimension

POSCAP

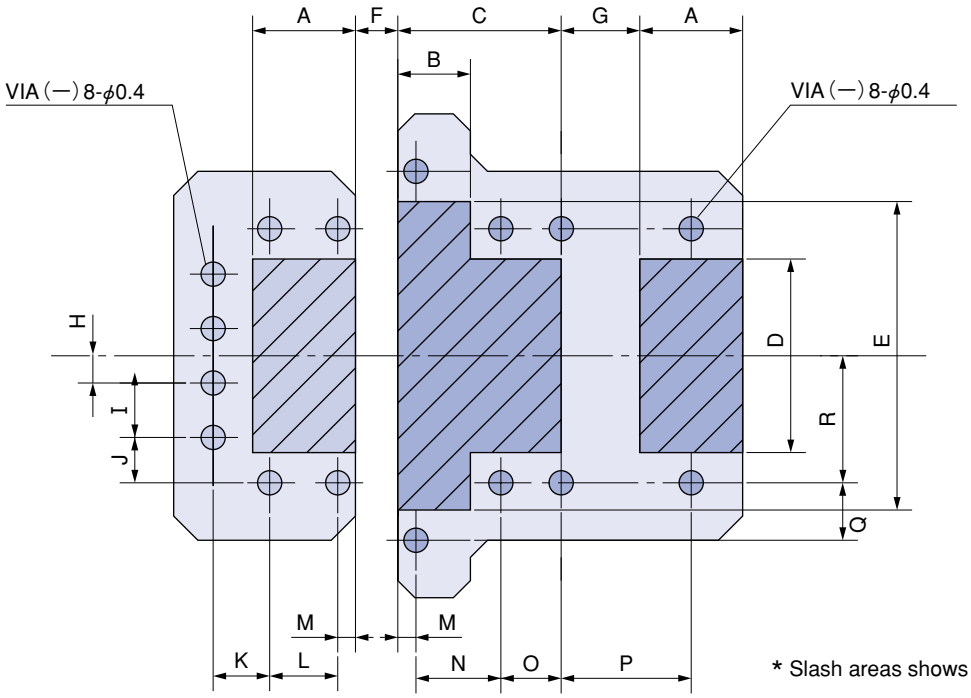
Except for TPL/TPLF series



(unit:mm)

Size code	a	b	c
S09	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/TPLF series



* 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)

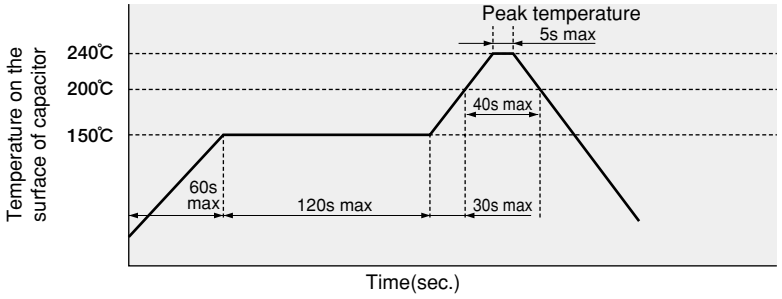
Size code	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
D common	2.2	1.2	2.7	2.9	5.1	0.5	1.0	0.45	0.9	0.75	1.4	1.1	0.3	1.4	1.0	2.15	0.95	2.1

Recommended soldering condition

POSCAP

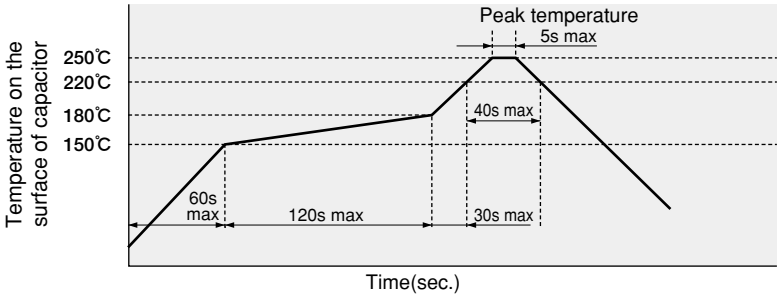
Recommended reflow soldering temperature profile

The cycles of reflow soldering: Twice (max)



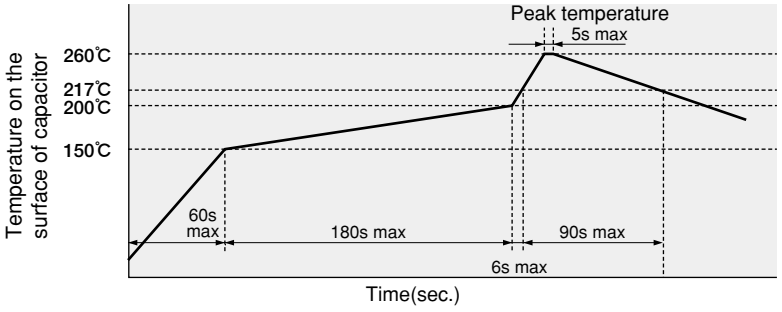
Peak temperature 250℃ lead free reflow soldering profile

The cycles of reflow soldering: Twice (max)



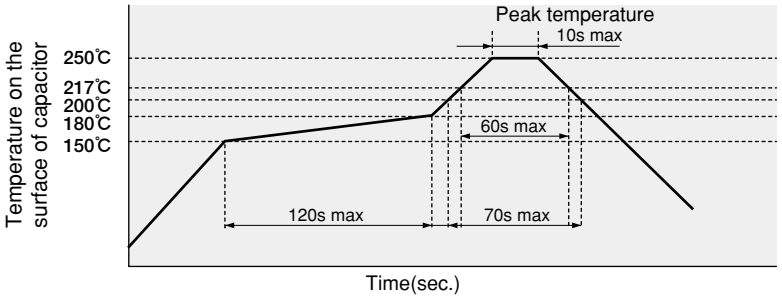
Peak temperature 260℃ lead free reflow soldering profile

The model of MSL"2a" is changed into MSL "3" with this reflow condition.(See page 71)
The cycles of reflow soldering: Twice (max)



TQC series

The cycles of reflow soldering: Twice (max)



Soldering with a soldering iron

Tip of a soldering iron: 350℃ max (TQC serise: 400℃ max) Power of a soldering iron: 30W max
Working time: 3sec. max (TQC serise: 5sec max)
(Do not let the tip of soldering iron touch the POSCAP itself. Do not subject the POSCAP itself to excessive stress when soldering.)

Image of case size

POSCAP

(Unit:mm)

S09 size

L2.0×W1.25×H0.9

P.87

TPU
2.5 to 10V
4.7 to 47μF

S11 size

L2.0×W1.25×H1.1

P.87

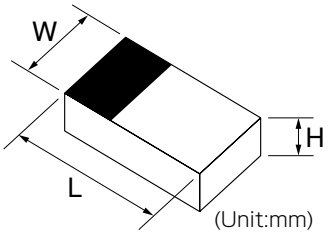
TPU
2.5 to 6.3V
33 to 68μF

A09 size

L3.2×W1.6×H0.9

P.87

TPU
2.5 to 10V
33 to 100μF



(Unit:mm)

B09 size

L3.5×W2.8×H0.9

P.87

TPU
6.3V
150μF

B1 size

L3.5×W2.8×H1.1

P.98 to 99

TPC
2.5 to 12.5V
10 to 56μF

B1G size

L3.5×W2.8×H1.1

P.91

TPG
2.5 to 12.5V
33 to 220μF

B15G size

L3.5×W2.8×H1.4

P.91

TPG
4, 6.3V
150, 220μF

B2 size

L3.5×W2.8×H1.9

P.92 to 95

TPE
2.0 to 10V
47 to 330μF

P.96 to 97

TPB
2.5 to 10V
33 to 150μF

P.101

TA
4.0 to 10V
47 to 100μF

P.104

TQC
16 to 25V
5.6 to 15μF

B2S size

L3.5×W2.8×H1.9

P.86

TPSF
2.0 to 10V
62 to 270μF

C1 size

L6.0×W3.2×H1.4

P.98 to 99

TPC
2.5 to 8V
33 to 100μF

C2 size

L6.0×W3.2×H1.8

P.92 to 95

TPE
2.5 to 8V
100 to 330μF

C3 size

L6.0×W3.2×H2.5

P.92 to 95

TPE
6.3, 10V
150 to 220μF

C size

L6.0×W3.2×H2.8

P.96 to 97

TPB
2.5 to 10V
47 to 220μF

P.104

TQC
16 to 25V
10 to 22μF

Image of case size

POSCAP

(Unit:mm)

D12T size

L7.3×W4.3×H1.1

P.88 to 89

TPL
2 to 6.3V
100 to 220μF

D15T size

L7.3×W4.3×H1.4

P.88 to 89

TPL
2.5 to 6.3V
150 to 330μF

D2T size

L7.3×W4.3×H1.8

P.88 to 89

TPL
2 to 2.5V
330 to 470μF

P.88 to 89

TPLF
2.0V
220 to 560μF

D2E size

L7.3×W4.3×H1.8

P.90

TPF
2V
220, 330μF

P.92 to 95

TPE
2 to 10V
68 to 470μF

P.101

TA
2.5 to 10V
68 to 470μF

P.102 to 103

TH
2.5 to 6.3V
150 to 330μF

D2 size

L7.3×W4.3×H1.9

P.98 to 99

TPC
6.3 to 10V
68 to 330μF

P.102 to 103

TH
2.5 to 10V
68 to 220μF

P.104

TQC
16 to 35V
10 to 68μF

D3L size

L7.3×W4.3×H2.8

P.90

TPF
2.5 to 10V
150 to 680μF

P.92 to 95

TPE
2.5 to 10V
220 to 680μF

P.96 to 97

TPB
4 to 10V
100 to 330μF

P.101

TA
2.5 to 10V
220 to 680μF

P.102 to 103

TH
2.5 to 10V
100 to 470μF

P.104

TQC
16 to 25V
33 to 68μF

D3 size

L7.3×W4.3×H3.1

P.104

TQC
16V
100μF

D4D size

L7.3×W4.3×H3.6

P.100

TPD
2.5 to 6.3V
470 to 1,000μF

P.102 to 103

TH
2.5 to 6.3V
330 to 680μF

D4 size

L7.3×W4.3×H3.8

P.92 to 95

TPE
2.5 to 10V
330 to 1,500μF

P.96 to 97

TPB
6.3 to 10V
220 to 470μF

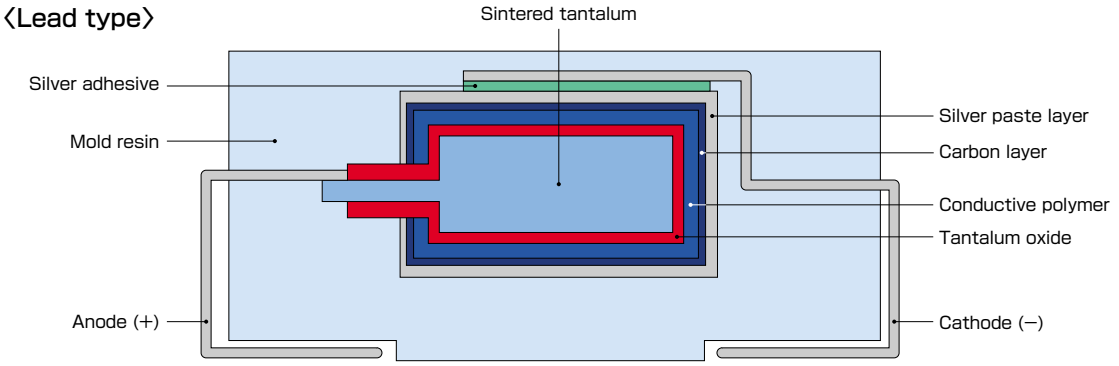
P.102 to 103

TH
2.5 to 10V
220 to 1,000μF

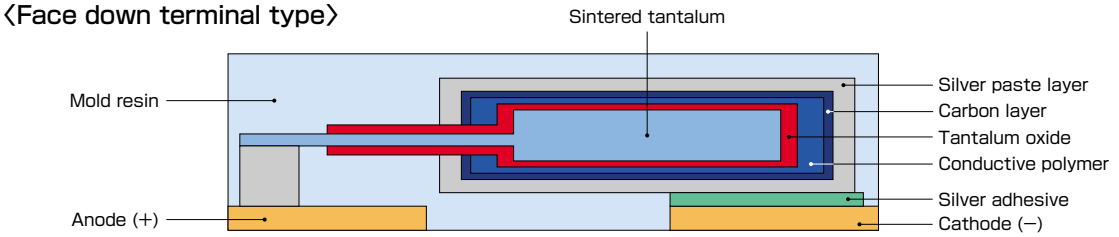
The size of each photo is nearly to full scale.

Structure of POSCAP

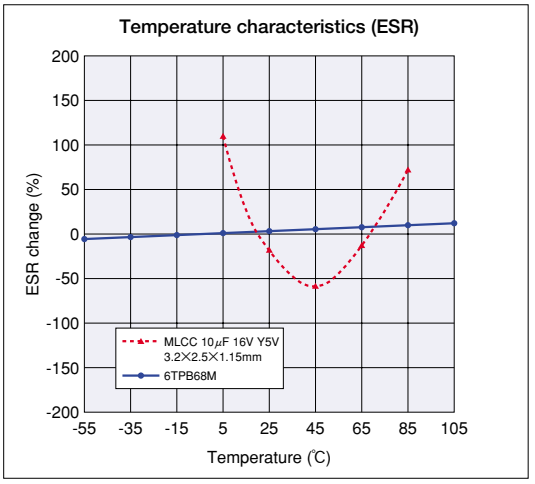
〈Lead type〉

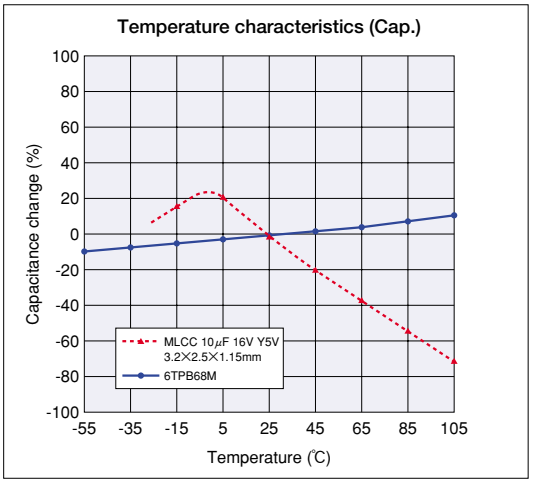


〈Face down terminal type〉

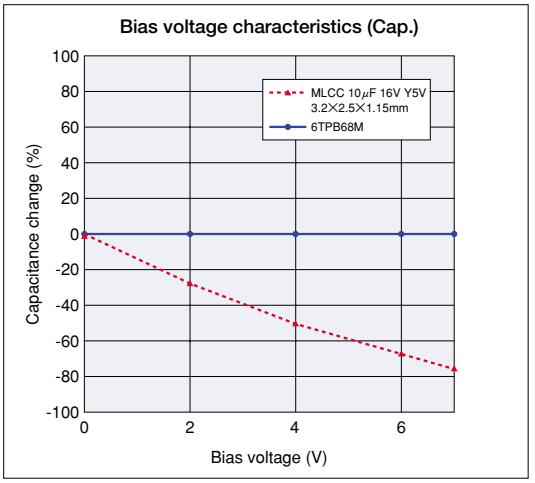


ESR temperature characteristics of POSCAP

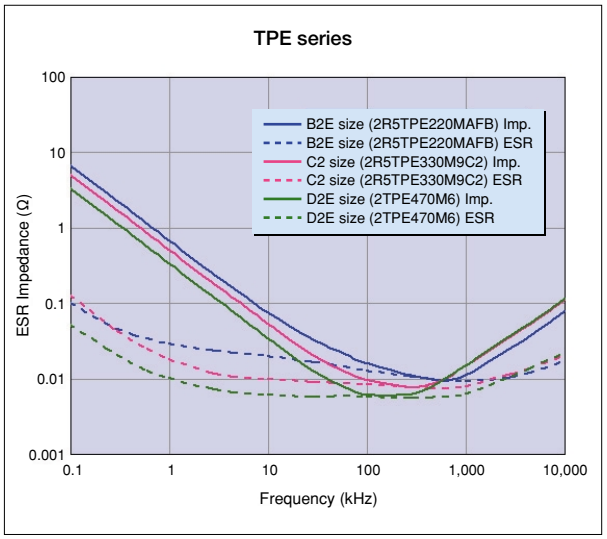


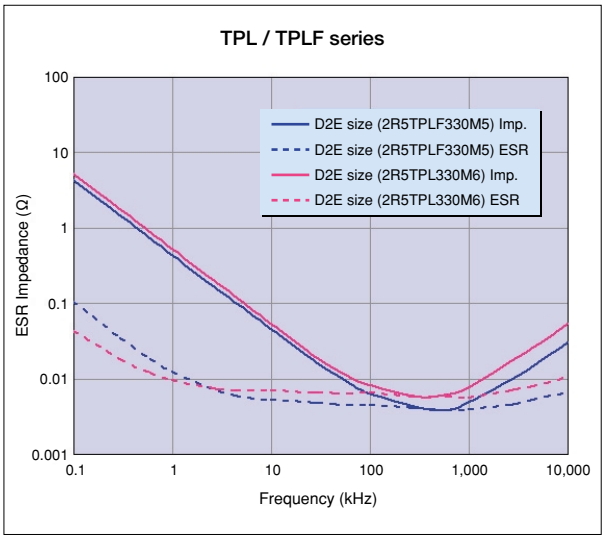


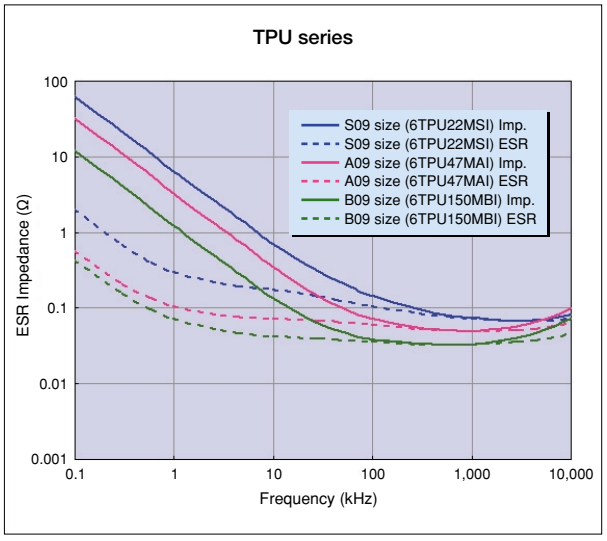
Bias characteristics of POSCAP

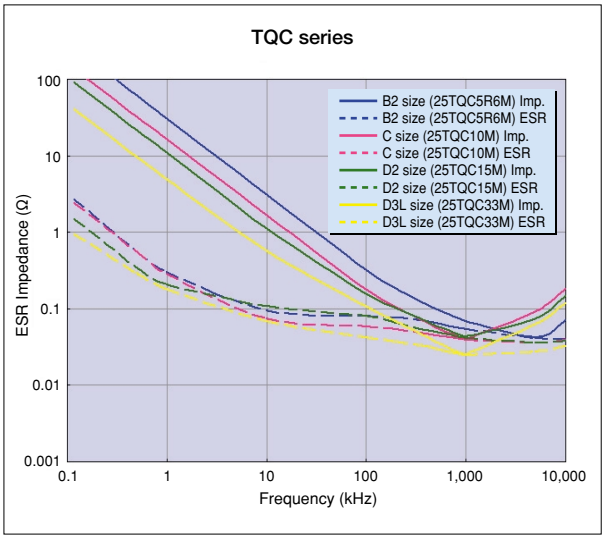


Frequency characteristics of POSCAP









Conductive polymer type / Surface mount type **RoHS compliance**

TPSF Series

Low ESR・Small size・High capacitance

Face down terminal type

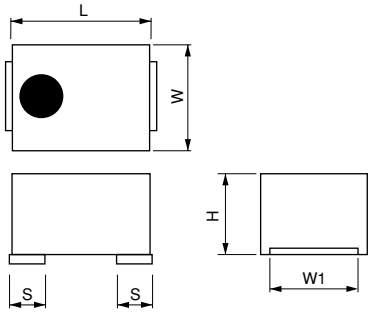
TPSF series achieved small size, high capacitance and low ESR.

TPF → TPSF Small size

■ Specifications

Items	Condition		Specifications	
Rated voltage (V)	–		2.0	10
Surge voltage (V)	–		2.6	13
Category temperature range (℃)	–		−55 to +105	
Capacitance tolerance (%)	120Hz/20℃		M : ±20	
Rated capacitance range (μF)	120Hz/20℃		62 , 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 of the initial limit	
		LC	≤ 1.5 times of 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 of the initial limit	
		LC	≤ 3 times of the initial limit	
Surge	105℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value	
		DF	≤ 3 times of the initial limit	
		LC	≤ 3 times of 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	10
62		B2S
270	B2S	

■ TPSF series characteristics list

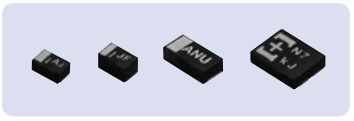
Size code	Part number	Rated voltage (V)	Rated temperature (℃)	Rated capacitance (μF)	Category voltage (V)	Category temperature (℃)	DF (% max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20℃	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow temp. ≤ 260℃	MSL Reflow temp. ≤ 250℃
B2S	10TPSF62MI※2	10	105	62	10	105	8.0	124	18	1800	3	3
	2TPSF270M9G	2.0	105	270	2.0	105	8.0	108	9/300kHz	2400	3	3

Please refer to page 71 for the compensation coefficient of maximum allowable ripple current.

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

Conductive polymer type / Surface mount type **RoHS compliance**

TPU Series



Small size・Low profile

Face down terminal type

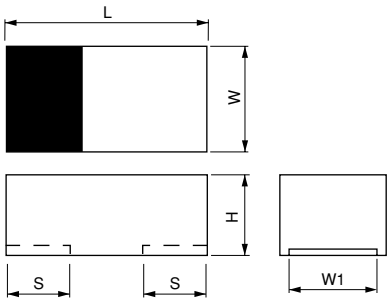
TPU series has a real advantage in size-sensitive applications using a face down terminal structure.

TPC → TPU (Small size, Low profile)

■ 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 150			
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 of the initial limit			
		LC	≤ 1.5 times of 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 of the initial limit			
		LC	≤ 3 times of the initial limit			
Surge	85℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value			
		DF	≤ 3 times of the initial limit			
		LC	≤ 3 times of 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
S09	2.0	1.25	0.9	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
4.7				S09
10			S09	
15		S09		
22	S09		S09	
33		S09	S11	A09
47	S09	S11	A09	
68	S11	A09		
100	A09			
150			B09	

■ TPU series characteristics list

Size code	Part number	Rated voltage (V)	Rated temperature (℃)	Rated capacitance (μF)	Category voltage (V)	Category temperature (℃)	DF (% max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20℃	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow temp. ≤ 260℃	MSL Reflow temp. ≤ 250℃
S09	10TPU4R7MSI	10	85	4.7	10	85	10.0	4.7	500	280	—	3
	6TPU10MSI	6.3	85	10	6.3	85	10.0	6.3	250	400	—	3
	4TPU15MSI	4.0	85	15	4.0	85	10.0	6.0	250	400	—	3
	2R5TPU22MSI	2.5	85	22	2.5	85	10.0	5.5	250	400	—	3
	6TPU22MSI	6.3	85	22	6.3	85	10.0	27.7	150	510	—	3
	4TPU33MSI	4.0	85	33	4.0	85	10.0	26.4	150	510	—	3
	2R5TPU47MSI	2.5	85	47	2.5	85	10.0	23.5	150	510	—	3
S11	6TPU33MSK	6.3	85	33	6.3	85	10.0	41.6	150	510	—	3
	4TPU47MSK	4.0	85	47	4.0	85	10.0	37.6	150	510	—	3
	2R5TPU68MSK	2.5	85	68	2.5	85	10.0	34.0	150	510	—	3
A09	10TPU33MAI	10	85	33	10	85	10.0	33.0	150	510	3	3
	6TPU47MAI	6.3	85	47	6.3	85	10.0	29.6	150	510	3	3
	4TPU68MAI	4.0	85	68	4.0	85	10.0	27.2	150	510	3	3
	2R5TPU100MAI	2.5	85	100	2.5	85	10.0	25.0	150	510	3	3
B09	6TPU150MBI※2	6.3	85	150	6.3	85	10.0	94.5	100	670	3	3

Please refer to page 71 for the compensation coefficient of maximum allowable ripple current.

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

Conductive polymer type / Surface mount type **RoHS compliance**

TPL·TPLF Series

Low ESR・Low ESL

Face down terminal type

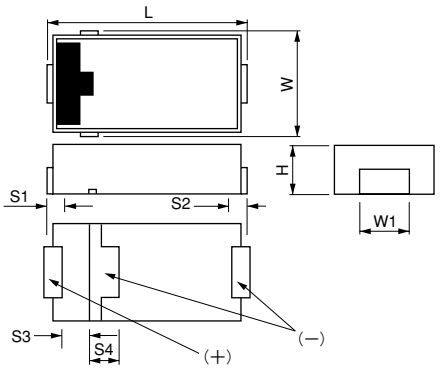
TPL series has a low ESL and low ESR advantage using an unique face down terminal structure.

TPB (Standard) → TPL/TPLF Low ESL Low ESR

■ 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 of the initial limit			
		LC	≤ 1.5 times of 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 of the initial limit			
		LC	≤ 3 times of the initial limit			
Surge	105℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value			
		DF	≤ 3 times of the initial limit			
		LC	≤ 3 times of the initial limit			

■ Dimensions



■ 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	D15T
330	D2T	D15T,D2T		
470		D2T		
560	D2T			

(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

■TPL・TPLF series characteristics list

(TPL)

Size code	Part number	Rated voltage (V)	Rated temperature (℃)	Rated capacitance (μF)	Category voltage (V)	Category temperature (℃)	DF (% max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20℃	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow temp. ≤ 260℃	MSL Reflow temp. ≤ 250℃
D12T	6TPL100MD※2	6.3	105	100	6.3	105	10.0	126.0	25	2100	3	2a
	4TPL150MD※2	4.0	105	150	4.0	105	10.0	120.0	25	2100	3	2a
	2TPL220MD※2	2.0	105	220	2.0	105	10.0	88.0	25	2100	3	2a
D15T	6TPL150MU	6.3	105	150	6.3	105	10.0	189.0	25	2100	3	2a
	6TPL220MU※2	6.3	105	220	6.3	105	10.0	277.2	25	2100	3	2a
	4TPL220MKU	4.0	105	220	4.0	105	10.0	176.0	20	2400	3	2a
	2R5TPL330MFU	2.5	105	330	2.5	105	10.0	165.0	15	2800	3	2a
	2R5TPL220MIU	2.5	105	220	2.5	105	10.0	110.0	18	2500	3	2a
D2T	2R5TPL470MC	2.5	105	470	2.5	105	10.0	117.5	12	3400	3	2a
	2R5TPL470M9	2.5	105	470	2.5	105	10.0	117.5	9	3900	3	2a
	2R5TPL470M8	2.5	105	470	2.5	105	10.0	235.0	8	4100	3	2a
	2R5TPL470M7※2	2.5	105	470	2.5	105	10.0	235.0	7	4400	3	2a
	2R5TPL330MC	2.5	105	330	2.5	105	10.0	82.5	12	3400	3	2a
	2R5TPL330M9	2.5	105	330	2.5	105	10.0	82.5	9	3900	3	2a
	2R5TPL330M8	2.5	105	330	2.5	105	10.0	165.0	8	4100	3	2a
	2R5TPL330M7※2	2.5	105	330	2.5	105	10.0	165.0	7	4400	3	2a
	2TPL330M6E※2	2.0	105	330	2.0	105	10.0	132.0	6/500kHz	4100	—	2a

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

(TPLF)

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

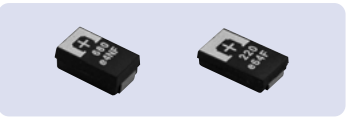
Please refer to page 71 for the compensation coefficient of maximum allowable ripple current.

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

SANYO

Conductive polymer type / Surface mount type — RoHS compliance

TPF Series



Low ESR
High capacitance

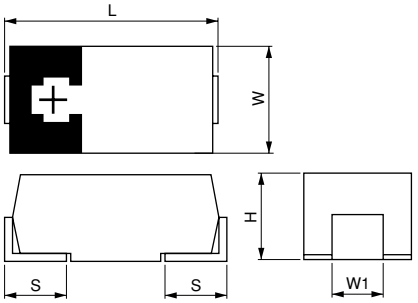
TPF series has low ESR and high capacitance at standard form.

TPE → TPF (Low ESR, High capacitance)

■ 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 of the initial limit				
		LC	≤ 1.5 times of 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 of the initial limit				
		LC	≤ 3 times of the initial limit				
Surge	105℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value				
		DF	≤ 3 times of the initial limit				
		LC	≤ 3 times of 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		D3L	D3L		
680		D3L			

■TPF series characteristics list

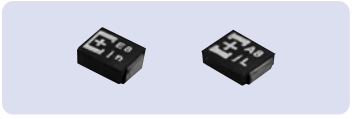
Size code	Part number	Rated voltage (V)	Rated temperature (℃)	Rated capacitance (μF)	Category voltage (V)	Category temperature (℃)	DF (% max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20℃	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow temp. ≤ 260℃	MSL Reflow temp. ≤ 250℃
D3L	10TPF150ML	10	105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

Please refer to page 71 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45℃

Conductive polymer type / Surface mount type **RoHS compliance**

TPG Series



Small size

High capacitance

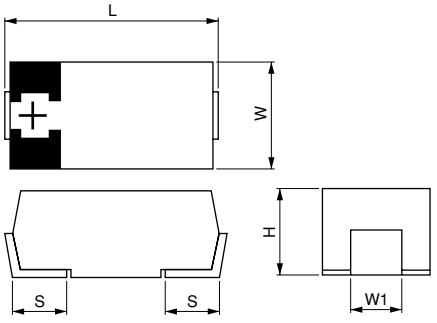
TPG series is high capacitance model of the small size . low profile product.
Suitable for the miniaturization design of the electronics device.

TPC → TPG (Small size, Low profile)

■ 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 of the initial limit					
		LC	≤ 1.5 times of 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 of the initial limit					
		LC	≤ 3 times of the initial limit					
Surge	85℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value					
		DF	≤ 3 times of the initial limit					
		LC	≤ 3 times of 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			B15G			
220	B1G	B15G				

■TPG series characteristics list

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

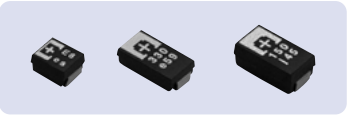
Please refer to page 71 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45℃

SANYO

Conductive polymer type / Surface mount type **RoHS compliance**

TPE Series



Low ESR (B2,C2,C3 size)

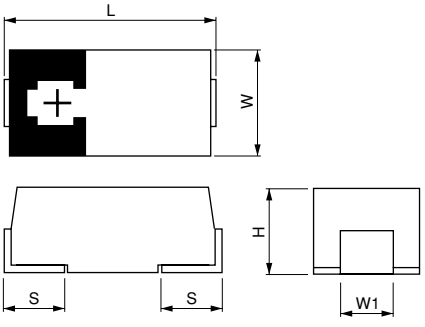
This products is the miniaturized version of TPE series.

TPB (Standard) → TPE Low ESR

■ 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 of the initial limit					
		LC		≤ 1.5 times of the initial limit					
Damp heat (Steady State)	60℃, 90 to 95%RH, 500h, No-applied voltage	△C/C		Within+50%, −20%〈2R5TPE220MDGB(MAZB,MAPB,MAFB), 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 of the initial limit					
		LC		≤ 3 times of the initial limit					
Surge	105℃, 1,000 cycles, 1kΩ discharge resistance,surge voltage applied ※Rated temp 85℃ products: 85℃, 1,000 cycles	△C/C		Within±5% of the initial value					
		DF		≤ 3 times of the initial limit					
		LC		≤ 3 times of 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	B2,C3		
330	B2	B2,C2				

■TPE series characteristics list

Size code	Part number	Rated voltage (V)	Rated temperature (℃)	Rated capacitance (μF)	Category voltage (V)	Category temperature (℃)	DF (% max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20℃	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow temp. ≤ 260℃	MSL Reflow temp. ≤ 250℃
B2	10TPE47MAZB	10	85	47	8.0	105	8.0	47.0	35	1400	3	3
	6TPE220MAZB※2	6.3	85	220	5.0	105	8.0	138.6	35	1400	3	3
	6TPE150MAZB	6.3	85	150	5.0	105	8.0	94.5	35	1400	3	3
	6TPE150MAPB	6.3	85	150	5.0	105	8.0	189.0	25	1600	3	3
	6TPE120MAZB	6.3	85	120	5.0	105	8.0	75.6	35	1400	3	3
	6TPE100MZB	6.3	105	100	6.3	105	8.0	63.0	35	1400	3	3
	6TPE100MPB	6.3	105	100	6.3	105	8.0	63.0	25	1600	3	3
	6TPE100MAZB	6.3	85	100	5.0	105	8.0	63.0	35	1400	3	3
	4TPE220MAZB	4.0	85	220	3.2	105	8.0	88.0	35	1400	3	3
	4TPE150MAZB	4.0	85	150	3.2	105	8.0	60.0	35	1400	3	3
	4TPE150MAUB	4.0	85	150	3.2	105	8.0	60.0	30	1500	3	3
	4TPE100MZB	4.0	105	100	4.0	105	8.0	40.0	35	1400	3	3
	2R5TPE330MAZB	2.5	85	330	2.0	105	8.0	82.5	35	1400	3	3
	2R5TPE220MZB	2.5	105	220	2.5	105	8.0	55.0	35	1400	3	3
	2R5TPE220MPB	2.5	105	220	2.5	105	8.0	55.0	25	1600	3	3
	2R5TPE220MLB	2.5	105	220	2.5	105	8.0	55.0	21	1700	3	3
	2R5TPE220MIB	2.5	105	220	2.5	105	8.0	110.0	18	1800	3	3
	2R5TPE220MFGB	2.5	105	220	2.5	105	8.0	110.0	15/300k	1800	3	3
	2R5TPE220MDGB	2.5	105	220	2.5	105	8.0	110.0	13/300k	2000	3	3
	2R5TPE220MAZB	2.5	85	220	2.0	105	8.0	55.0	35	1400	3	3
	2R5TPE220MAPB	2.5	85	220	2.0	105	8.0	55.0	25	1600	3	3
	2R5TPE220MAFB	2.5	85	220	2.0	105	8.0	110.0	15	2000	3	3
	2R5TPE150MZB	2.5	105	150	2.5	105	8.0	37.5	35	1400	3	3
	2TPE330MIB	2.0	105	330	2.0	105	8.0	132.0	18	1800	3	3
	2TPE330MFB	2.0	105	330	2.0	105	8.0	132.0	15	2000	3	3
	2TPE330MAFGB	2.0	85	330	1.8	105	8.0	132.0	15/300k	1800	3	3
	2TPE330MAFB	2.0	85	330	1.8	105	8.0	132.0	15	2000	3	3
	2TPE330MADGB	2.0	85	330	1.8	105	8.0	132.0	13/300k	2000	3	3
C2	8TPE100MPC2	8.0	105	100	8.0	105	8.0	80.0	25	2200	3	3
	6TPE150MPC2	6.3	105	150	6.3	105	8.0	94.5	25	2200	3	3
	6TPE150MIC2	6.3	105	150	6.3	105	8.0	94.5	18	2600	3	3
	4TPE220MPC2	4.0	105	220	4.0	105	8.0	88.0	25	2200	3	3
	4TPE220MIC2	4.0	105	220	4.0	105	8.0	88.0	18	2600	3	3
	4TPE220MFC2	4.0	105	220	4.0	105	8.0	88.0	15	2900	3	3
	2R5TPE330MIC2	2.5	105	330	2.5	105	8.0	82.5	18	2600	3	3
	2R5TPE330MFC2	2.5	105	330	2.5	105	8.0	82.5	15	2900	3	3
	2R5TPE330MCC2	2.5	105	330	2.5	105	8.0	82.5	12	3300	3	3
	2R5TPE330M9C2	2.5	105	330	2.5	105	8.0	82.5	9	3700	3	3
C3	10TPE180MGC	10	105	180	10	105	10.0	180.0	55	1500	—	3
	10TPE150MGC	10	105	150	10	105	10.0	150.0	55	1500	—	3
	6TPE220MPC	6.3	105	220	6.3	105	8.0	138.6	25	2400	3	3
	6TPE220MIC	6.3	105	220	6.3	105	8.0	138.6	18	2800	3	3

Please refer to page 71 for the compensation coefficient of maximum allowable ripple current.

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

SANYO

Conductive polymer type / Surface mount type — RoHS compliance

TPE Series

Low ESR (D2E, D3L, D4 size)

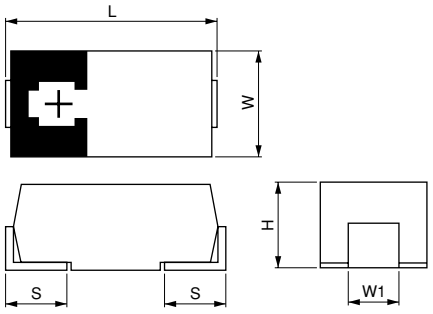
TPE series has low ESR and can aid in the miniaturization of many products.

TPB (Standard) → TPE Low ESR

■ 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℃		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 of the initial limit				
		LC	≤ 1.5 times of 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 of the initial limit				
		LC	≤ 3 times of the initial limit				
Surge	105℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied ※6TPE330MAP, 6TPE220MAP:85℃	△C/C	Within±5% of the initial value				
		DF	≤ 3 times of the initial limit				
		LC	≤ 3 times of the initial limit				

■ Dimensions



■ Size list

RV : Rated voltage

μF \ RV	2.0	2.5	4.0	6.3	10
68					D2E
100				D2E	
150			D2E	D2E	
220		D2E	D2E	D2E	D3L
330	D2E	D2E	D2E	D2E,D3L	D4
470	D2E	D2E	D3L	D4	
680		D3L	D4	D4	
1,000		D4			
1,500		D4			

(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

■TPE series characteristics list

Size code	Part number	Rated voltage (V)	Rated temperature (℃)	Rated capacitance (μF)	Category voltage (V)	Category temperature (℃)	DF (% max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20℃	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow temp. ≤ 260℃	MSL Reflow temp. ≤ 250℃
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	3	2a
	6TPE220MAP	6.3	85	220	5.0	105	10.0	138.6	25	2400	3	2a
	6TPE220M	6.3	105	220	6.3	105	10.0	138.6	25	2400	3	2a
	6TPE220MI	6.3	105	220	6.3	105	10.0	138.6	18	2800	3	2a
	6TPE150M	6.3	105	150	6.3	105	10.0	94.5	25	2400	3	2a
	6TPE150MI	6.3	105	150	6.3	105	10.0	94.5	18	2800	3	2a
	6TPE100M	6.3	105	100	6.3	105	10.0	63.0	25	2400	3	2a
	6TPE100MI	6.3	105	100	6.3	105	10.0	63.0	18	2800	3	2a

Conductive polymer type / Surface mount type — RoHS compliance

■TPE series characteristics list

Size code	Part number	Rated voltage (V)	Rated temperature (℃)	Rated capacitance (μF)	Category voltage (V)	Category temperature (℃)	DF (% max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20℃	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow temp. ≤ 260℃	MSL Reflow temp. ≤ 250℃
D2E	4TPE330M	4.0	105	330	4.0	105	10.0	132.0	25	2400	3	2a
	4TPE330MI	4.0	105	330	4.0	105	10.0	132.0	18	2800	3	2a
	4TPE220M	4.0	105	220	4.0	105	10.0	88.0	25	2400	3	2a
	4TPE220MI	4.0	105	220	4.0	105	10.0	88.0	18	2800	3	2a
	4TPE220MF	4.0	105	220	4.0	105	10.0	88.0	15	3100	3	2a
	4TPE150M	4.0	105	150	4.0	105	10.0	60.0	25	2400	3	2a
	4TPE150MI	4.0	105	150	4.0	105	10.0	60.0	18	2800	3	2a
	2R5TPE470M	2.5	105	470	2.5	105	10.0	117.5	25	2400	3	2a
	2R5TPE470MI	2.5	105	470	2.5	105	10.0	117.5	18	2800	3	2a
	2R5TPE470MF	2.5	105	470	2.5	105	10.0	117.5	15	3100	3	2a
	2R5TPE470MC	2.5	105	470	2.5	105	10.0	117.5	12	3500	3	2a
	2R5TPE470M9	2.5	105	470	2.5	105	10.0	117.5	9	3900	3	2a
	2R5TPE470M7	2.5	105	470	2.5	105	10.0	235.0	7	4400	3	2a
	2R5TPE330M	2.5	105	330	2.5	105	10.0	82.5	25	2400	3	2a
	2R5TPE330MI	2.5	105	330	2.5	105	10.0	82.5	18	2800	3	2a
	2R5TPE330MF	2.5	105	330	2.5	105	10.0	82.5	15	3100	3	2a
	2R5TPE330MC	2.5	105	330	2.5	105	10.0	82.5	12	3500	3	2a
	2R5TPE330M9	2.5	105	330	2.5	105	10.0	82.5	9	3900	3	2a
	2R5TPE330M7	2.5	105	330	2.5	105	10.0	165.0	7	4400	3	2a
	2R5TPE220M	2.5	105	220	2.5	105	10.0	55.0	25	2400	3	2a
	2R5TPE220MI	2.5	105	220	2.5	105	10.0	55.0	18	2800	3	2a
	2R5TPE220MF	2.5	105	220	2.5	105	10.0	55.0	15	3100	3	2a
	2R5TPE220MC	2.5	105	220	2.5	105	10.0	55.0	12	3500	3	2a
	2R5TPE220M9	2.5	105	220	2.5	105	10.0	55.0	9	3900	3	2a
	2R5TPE220M7	2.5	105	220	2.5	105	10.0	110.0	7	4400	3	2a
	2TPE470M9	2.0	105	470	2.0	105	10.0	188.0	9	3900	3	2a
	2TPE470M7	2.0	105	470	2.0	105	10.0	188.0	7	4400	3	2a
	2TPE470M6※2	2.0	105	470	2.0	105	10.0	188.0	6	4700	3	2a
	2TPE330M9	2.0	105	330	2.0	105	10.0	132.0	9	3900	3	2a
	2TPE330M7	2.0	105	330	2.0	105	10.0	132.0	7	4400	3	2a
	2TPE330M6※2	2.0	105	330	2.0	105	10.0	132.0	6	4700	3	2a
D3L	10TPE220ML	10	105	220	10	105	10.0	220.0	25	2400	—	2a
	10TPE220MIL※2	10	105	220	10	105	10.0	220.0	18	2800	—	2a
	6TPE330ML	6.3	105	330	6.3	105	10.0	207.9	25	2400	3	2a
	6TPE330MIL	6.3	105	330	6.3	105	10.0	207.9	18	2800	3	2a
	6TPE330MFL	6.3	105	330	6.3	105	10.0	207.9	15	3100	3	2a
	4TPE470ML	4.0	105	470	4.0	105	10.0	188.0	25	2400	3	2a
	4TPE470MIL	4.0	105	470	4.0	105	10.0	188.0	18	2800	3	2a
	4TPE470MFL	4.0	105	470	4.0	105	10.0	188.0	15	3100	3	2a
	4TPE470MCL	4.0	105	470	4.0	105	10.0	188.0	12	3500	3	2a
	2R5TPE680ML	2.5	105	680	2.5	105	10.0	170.0	25	2400	3	2a
	2R5TPE680MIL	2.5	105	680	2.5	105	10.0	170.0	18	2800	3	2a
	2R5TPE680MFL	2.5	105	680	2.5	105	10.0	170.0	15	3100	3	2a
	2R5TPE680MCL	2.5	105	680	2.5	105	10.0	170.0	12	3500	3	2a
D4	10TPE330M	10	105	330	10	105	10.0	330.0	25	3000	—	2a
	6TPE680M	6.3	105	680	6.3	105	15.0	428.4	25	3000	3	2a
	6TPE680MI	6.3	105	680	6.3	105	15.0	428.4	18	3500	3	2a
	6TPE470M	6.3	105	470	6.3	105	15.0	296.1	25	3000	3	2a
	6TPE470MI	6.3	105	470	6.3	105	15.0	296.1	18	3500	3	2a
	4TPE680M	4.0	105	680	4.0	105	15.0	272.0	25	3000	3	2a
	4TPE680MI	4.0	105	680	4.0	105	15.0	272.0	18	3500	3	2a
	4TPE680MF	4.0	105	680	4.0	105	15.0	272.0	15	3900	3	2a
	2R5TPE1000M	2.5	105	1000	2.5	105	15.0	250.0	25	3000	3	2a
	2R5TPE1000MI	2.5	105	1000	2.5	105	15.0	250.0	18	3500	3	2a
	2R5TPE1000MF	2.5	105	1000	2.5	105	15.0	250.0	15	3900	3	2a
	2R5TPE1500MF	2.5	105	1500	2.5	105	15.0	375.0	15	3900	—	2a
	2R5TPE1500MC	2.5	105	1500	2.5	105	15.0	375.0	12	4400	—	2a

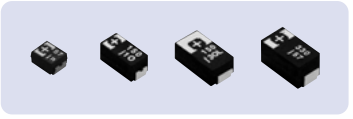
Please refer to page 71 for the compensation coefficient of maximum allowable ripple current.

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

SANYO

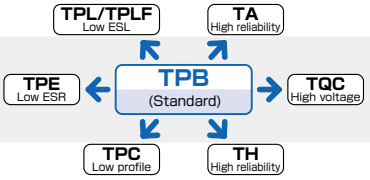
Conductive polymer type / Surface mount type — RoHS compliance

TPB Series



Standard

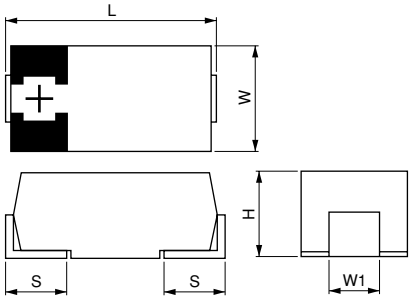
TPB series are the standard products corresponding to the diversification of the needs.
B2 size is the miniaturized version of TPB series.



■ 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 470				
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 B2 size :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 of the initial limit				
		LC	≤ 1.5 times of 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 of the initial limit				
		LC	≤ 3 times of the initial limit				
Surge	105℃, 1,000 cycles, 1kΩdischarge resistance, surge voltage applied ※4TPB150MA:85℃	△C/C	Within±5% of the initial value				
		DF	≤ 3 times of the initial limit				
		LC	≤ 3 times of the initial limit				

■ Dimensions



(unit: mm)

Size code	L ±0.2※1	W ±0.2	H ±0.2	S ±0.2	W1 ±0.1
B2	3.5	2.8	1.9	0.8	2.2
C	6.0	3.2	2.8	1.3	1.8
D3L	7.3	4.3	2.8	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
33					B2
47					B2,C
68		B2	B2		C
82				C	
100	B2				D3L
150		B2,C			D3L
220	C		D3L		C,D3L,D4
330		D3L	D3L,D4		D4
470			D4		

■TPB series characteristics list

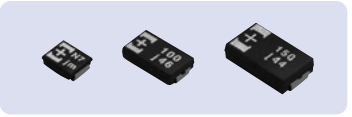
Size code	Part number	Rated voltage (V)	Rated temperature (℃)	Rated capacitance (μF)	Category voltage (V)	Category temperature (℃)	DF (% max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20℃	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow temp. ≤ 260℃	MSL Reflow temp. ≤ 250℃
B2	10TPB47M	10	105	47	10	105	8.0	47.0	70	1100	3	3
	10TPB33M	10	105	33	10	105	8.0	33.0	70	1100	3	3
	6TPB68M	6.3	105	68	6.3	105	8.0	42.8	70	1100	3	3
	4TPB150MA	4.0	85	150	3.2	105	8.0	60.0	70	1100	3	3
	4TPB68M	4.0	105	68	4.0	105	8.0	27.2	70	1100	3	3
	2R5TPB100M	2.5	105	100	2.5	105	8.0	25.0	70	1100	3	3
C	10TPB68MC	10	105	68	10.0	105	8.0	68.0	55	1500	3	3
	10TPB47MC	10	105	47	10.0	105	8.0	47.0	55	1500	3	3
	8TPB82MC	8.0	105	82	8.0	105	8.0	65.6	45	1700	3	3
	4TPB150MC	4.0	105	150	4.0	105	8.0	60.0	45	1700	3	3
	2R5TPB220MC	2.5	105	220	2.5	105	8.0	55.0	45	1700	3	3
D3L	10TPB220ML	10	105	220	10	105	10.0	220.0	40	2000	—	2a
	10TPB150ML	10	105	150	10	105	10.0	150.0	40	2000	3	2a
	10TPB100ML	10	105	100	10	105	8.0	100.0	55	1900	3	2a
	6TPB330ML	6.3	105	330	6.3	105	10.0	207.9	40	2000	3	2a
	6TPB220ML	6.3	105	220	6.3	105	10.0	138.6	40	2000	3	2a
	4TPB330ML	4.0	105	330	4.0	105	10.0	132.0	40	2000	3	2a
D4	10TPB330M	10	105	330	10	105	10.0	330.0	35	3000	—	2a
	10TPB220M	10	105	220	10	105	10.0	220.0	40	3000	3	2a
	6TPB470M	6.3	105	470	6.3	105	15.0	296.1	35	3000	3	2a
	6TPB330M	6.3	105	330	6.3	105	10.0	207.9	40	3000	3	2a

Please refer to page 71 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45℃

Conductive polymer type / Surface mount type **RoHS compliance**

TPC Series



Low profile

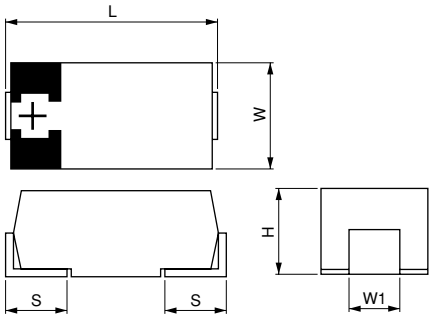
TPC series has low profile and low ESR.
TPC series aids in the miniaturization of any products.
B1 size is miniaturized, low profile version of TPC series.

TPB (Standard) → TPC Low profile

■ 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	16.0
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 of the initial limit					
		LC	≤ 1.5 times of 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 of the initial limit					
		LC	≤ 3 times of the initial limit					
Surge	105℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied ※Rated temp. 85℃ products : 85℃	△C/C	Within±5% of the initial value					
		DF	≤ 3 times of the initial limit					
		LC	≤ 3 times of 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
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	12.5
10						B1
15						B1
22				B1		
33			B1	C1	B1	
47		B1	B1			
56	B1	C1				
68			C1		D2	
82	C1					
100		C1	D2,C1		D2	
150			D2	D2		
330			D2			

■TPC series characteristics list

Size code	Part number	Rated voltage (V)	Rated temperature (℃)	Rated capacitance (μF)	Category voltage (V)	Category temperature (℃)	DF (% max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20℃	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow temp. ≤ 260℃	MSL Reflow temp. ≤ 250℃
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	3	3
	10TPC33MB	10	85	33	8.0	105	10.0	33.0	70	1000	3	3
	8TPC22M	8.0	85	22	6.3	105	10.0	17.6	70	1000	3	3
	6TPC47MB	6.3	85	47	5.0	105	10.0	29.6	70	1000	3	3
	6TPC33M	6.3	85	33	5.0	105	10.0	20.8	70	1000	3	3
	4TPC47M	4.0	85	47	3.2	105	10.0	18.8	70	1000	3	3
	2R5TPC56M	2.5	85	56	2.0	105	10.0	14.0	70	1000	3	3
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	3	3
	6TPC68M	6.3	105	68	6.3	105	10.0	42.8	55	1300	3	3
	4TPC100M	4.0	105	100	4.0	105	10.0	40.0	55	1300	3	3
	4TPC56M	4.0	105	56	4.0	105	10.0	22.4	70	1200	3	3
	2R5TPC82M	2.5	105	82	2.5	105	10.0	20.5	70	1200	3	3
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	3	2a
	8TPC150M	8.0	105	150	8.0	105	10.0	120.0	40	1900	3	2a
	6TPC330MA	6.3	85	330	5.0	105	10.0	207.9	40	1900	3	2a
	6TPC150M	6.3	105	150	6.3	105	10.0	94.5	40	1900	3	2a
	6TPC100M	6.3	105	100	6.3	105	10.0	63.0	45	1700	3	2a

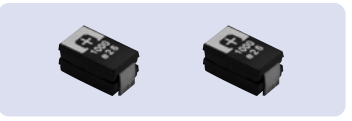
Please refer to page 71 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45℃

SANYO

Conductive polymer type / Surface mount type — RoHS compliance

TPD Series



Low ESR
High capacitance

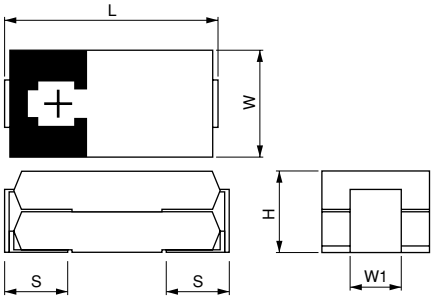
TPD series has low ESR and high capacitance.
It is the most suitable for the high frequency and high current switching power supply applications.

TPE → TPD (Low ESR, High capacitance)

■ 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 of the initial limit		
		LC	≤ 1.5 times of 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 of the initial limit		
		LC	≤ 3 times of the initial limit		
Surge	105℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value		
		DF	≤ 3 times of the initial limit		
		LC	≤ 3 times of 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	
1,000	D4D		

■TPD series characteristics list

Size code	Part number	Rated voltage (V)	Rated temperature (℃)	Rated capacitance (μF)	Category voltage (V)	Category temperature (℃)	DF (% max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20℃	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow temp. ≤ 260℃	MSL Reflow temp. ≤ 250℃
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	3	2a
	2R5TPD1000M	2.5	105	1000	2.5	105	10.0	250.0	10	4400	3	2a
	2R5TPD1000M8	2.5	105	1000	2.5	105	10.0	250.0	8	4900	3	2a
	2R5TPD1000M6	2.5	105	1000	2.5	105	10.0	250.0	6	5600	3	2a
	2R5TPD1000M5	2.5	105	1000	2.5	105	10.0	250.0	5	6100	3	2a
	2R5TPD680M6	2.5	105	680	2.5	105	10.0	170.0	6	5600	3	2a
	2R5TPD680M5	2.5	105	680	2.5	105	10.0	170.0	5	6100	3	2a
	2R5TPD470M6	2.5	105	470	2.5	105	10.0	117.5	6	5600	3	2a
	2R5TPD470M5	2.5	105	470	2.5	105	10.0	117.5	5	6100	3	2a

Please refer to page 71 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45℃

Conductive polymer type / Surface mount type **RoHS compliance**

TA Series

High reliability (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).

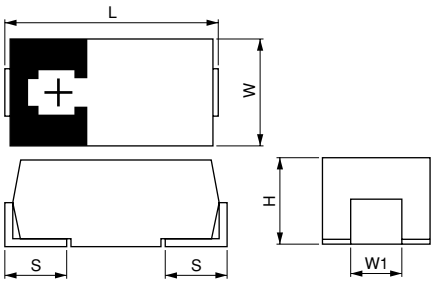
TPB (Standard) → TA High reliability

■ 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, (B2 size : 1,000h) rated voltage applied	△C/C	Within±20% of the initial value			
		DF	≤ 1.5 times of the initial limit			
		LC	≤ 1.5 times of 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 of the initial limit			
		LC	≤ 1.5 times of 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 of the initial limit			
		LC	≤ 3 times of the initial limit			
Surge	105℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value			
		DF	≤ 3 times of the initial limit			
		LC	≤ 3 times of 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	4.0	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	Part number	Rated voltage (V)	Rated temperature (℃)	Rated capacitance (μF)	Category voltage (V)	Category temperature (℃)	DF (% max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20℃	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow temp. ≤ 260℃	MSL Reflow temp. ≤ 250℃
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	3	3
	6TAB47M	6.3	105	47	6.3	105	8.0	29.6	70	1100	3	3
	4TAB100M	4.0	105	100	4.0	105	8.0	40.0	70	1100	3	3
D2E	10TAE68M	10	105	68	10	105	10.0	68	25	2400	3	3
	6TAE220M	6.3	105	220	6.3	105	10.0	138.6	25	2400	3	3
	6TAE220MI	6.3	105	220	6.3	105	10.0	138.6	18	2800	3	3
	6TAE150M	6.3	105	150	6.3	105	10.0	94.5	25	2400	3	3
	4TAE220M	4.0	105	220	4.0	105	10.0	88	25	2400	3	3
	4TAE220MI	4.0	105	220	4.0	105	10.0	88	18	2800	3	3
	2R5TAE470M	2.5	105	470	2.5	105	10.0	117.5	25	2400	3	3
	2R5TAE470MF	2.5	105	470	2.5	105	10.0	117.5	15	3100	3	3
	2R5TAE330M	2.5	105	330	2.5	105	10.0	82.5	25	2400	3	3
	2R5TAE330MI	2.5	105	330	2.5	105	10.0	82.5	18	2800	3	3
	2R5TAE330MF	2.5	105	330	2.5	105	10.0	82.5	15	3100	3	3
	2R5TAE220M	2.5	105	220	2.5	105	10.0	55	25	2400	3	3
	2R5TAE220MF	2.5	105	220	2.5	105	10.0	55	15	3100	3	3
D3L	10TAE220ML	10	105	220	10	105	10.0	220.0	25	2400	3	3
	6TAE330ML	6.3	105	330	6.3	105	10.0	207.9	25	2400	3	3
	4TAE470ML	4.0	105	470	4.0	105	10.0	188	25	2400	3	3
	4TAE470MIL	4.0	105	470	4.0	105	10.0	188	18	2800	3	3
	2R5TAE680ML	2.5	105	680	2.5	105	10.0	170	25	2400	3	3
	2R5TAE680MFL	2.5	105	680	2.5	105	10.0	170	15	3100	3	3

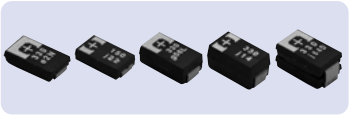
Please refer to page 71 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45℃

SANYO

Conductive polymer type / Surface mount type **RoHS compliance**

TH Series



Guaranteed at 125℃

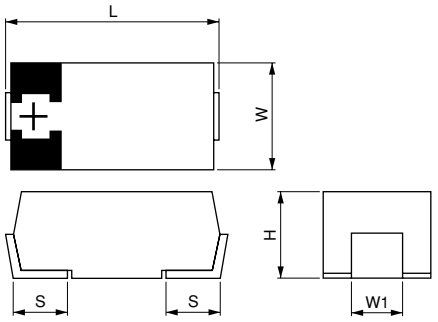
TH series has 125℃ capability guaranteed.
It is the most suitable for the high reliability industrial equipment.

TPB (Standard) → TH High reliability

■ 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 of the initial limit													
		LC	≤ 2 times of 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 of the initial limit													
		LC	≤ 3 times of the initial limit													
Surge	105℃, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied	△C/C	Within±5% of the initial value													
		DF	≤ 3 times of the initial limit													
		LC	≤ 3 times of 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 ※2 ±0.2:D3L,D4,D4D

■ Size list

RV : Rated voltage

μF	RV / Series	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			
1,000	THB	D4			

■TH series characteristics list

Series	Size code	Part number	Rated voltage (V)	Rated temperature (℃)	Rated capacitance (μF)	Category voltage (V)	Category temperature (℃)	DF (% max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20℃	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow temp. ≤ 260℃	MSL Reflow temp. ≤ 250℃
THB	D3L	10THB100ML	10	105	100	6.3	125	8.0	100.0	55	1900	—	5
		6THB220ML	6.3	105	220	4.0	125	10.0	138.6	40	2000	—	5
		4THB330ML	4.0	105	330	2.5	125	10.0	132.0	40	2000	—	5
		2R5THB470ML	2.5	105	470	1.6	125	10.0	117.5	40	2000	—	5
		2R5THB330ML	2.5	105	330	1.6	125	10.0	82.5	55	1900	—	5
	D4	10THB330M	10	105	330	6.3	125	10.0	330.0	35	3000	—	5
		10THB220M	10	105	220	6.3	125	10.0	220.0	40	3000	—	5
		6THB470M	6.3	105	470	4.0	125	15.0	296.1	35	3000	—	5
		6THB330M	6.3	105	330	4.0	125	10.0	207.9	40	3000	—	5
		4THB680M	4.0	105	680	2.5	125	15.0	272.0	35	3000	—	5
		2R5THB1000M	2.5	105	1000	1.6	125	15.0	250.0	30	3000	—	5
		2R5THB680M	2.5	105	680	1.6	125	10.0	170.0	40	3000	—	5
THC	D2	10THC68M	10	105	68	6.3	125	10.0	68.0	45	1700	—	5
		6THC150M	6.3	105	150	4.0	125	10.0	94.5	40	1900	—	5
		4THC220M	4.0	105	220	2.5	125	10.0	88.0	40	1900	—	5
		2R5THC220M	2.5	105	220	1.6	125	10.0	55.0	45	1700	—	5
THE	D2E	6THE150M	6.3	105	150	4.0	125	10.0	94.5	25	2400	—	5
		6THE150MI	6.3	105	150	4.0	125	10.0	94.5	18	2800	—	5
		4THE220M	4.0	105	220	2.5	125	10.0	88.0	25	2400	—	5
		4THE220MI	4.0	105	220	2.5	125	10.0	88.0	18	2800	—	5
		4THE220MF	4.0	105	220	2.5	125	10.0	88.0	15	3100	—	5
		2R5THE330M	2.5	105	330	1.6	125	10.0	82.5	25	2400	—	5
		2R5THE330MI	2.5	105	330	1.6	125	10.0	82.5	18	2800	—	5
		2R5THE330MF	2.5	105	330	1.6	125	10.0	82.5	15	3100	—	5
THD	D4D	6THD330M	6.3	105	330	4.0	125	10.0	207.9	10	4400	—	5
		4THD470M	4.0	105	470	2.5	125	10.0	188.0	10	4400	—	5
		2R5THD680M	2.5	105	680	1.6	125	10.0	170.0	10	4400	—	5

Please refer to page 71 for the compensation coefficient of maximum allowable ripple current.

※1 100k to 500kHz,45℃

Conductive polymer type / Surface mount type **RoHS compliance**

TQC Series

High voltage

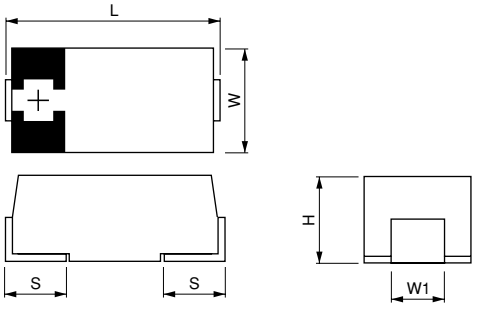
TQC series is perfect for high voltage, low ESR and low profile applications.
It is the most suitable for pass-con of the motor driver by 12V,
the input of the DCDC converter.

TPB (Standard) → TQC High voltage

■ Specifications

Items	Condition		Specifications			
Rated voltage (V)	–		16	20	25	35
Surge voltage (V)	–		20	23	29	40
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 Rated voltage applied	△C/C	Within ±20% of the initial value			
		DF	Within 1.5 times of the initial limit			
		LC	Within the initial limit			
Damp heat (Steady State)	60℃, 90 to 95%RH, 500h, No-applied voltage	△C/C	Within +40%, −20% of the initial value			
		DF	Within 1.5 times of the initial limit			
		LC	Within 3 times of the initial limit			
Surge	15 to 35℃, 1,000 cycies, 1kΩ discharge resistance, surge voltage applied	△C/C	Within ±5% of the initial value			
		DF	Within the initial limit			
		LC	Within 3 times of the initial limit			

■ Dimensions



(unit: mm)

Size code	L ±0.2※1	W ±0.2	H ±0.1※2	S ±0.2	W1 ±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	35
5.6			B2	
8.2		B2		
10	B2		C	D2
15	B2	C	D2	
22	C	D2	D2	
33	D2		D3L	
47	D2	D2, D3L		
68	D2, D3L			
100	D3			

■TQC series characteristics list

Size code	Part number	Rated voltage (V)	Rated temperature (℃)	Rated capacitance (μF)	Category voltage (V)	Category temperature (℃)	DF (% max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20℃	Maximum allowable ripple current (mArms) 100kHz※1	MSL Reflow temp. ≤ 260℃	MSL Reflow temp. ≤ 250℃
B2	25TQC5R6M	25	105	5.6	25	105	10.0	42.0	100	800	—	3
	20TQC8R2M	20	105	8.2	20	105	10.0	49.2	100	800	—	3
	16TQC15M	16	105	15	16	105	10.0	72.0	90	1000	—	3
	16TQC10M	16	105	10	16	105	10.0	48.0	100	800	—	3
C	25TQC10M	25	105	10	25	105	10.0	25.0	95	900	—	3
	20TQC15M	20	105	15	20	105	10.0	30.0	80	1000	—	3
	16TQC22M	16	105	22	16	105	10.0	35.2	80	1000	—	3
D2	35TQC10M	35	105	10	35	105	10.0	35.0	120	1000	—	3
	25TQC22M	25	105	22	25	105	10.0	55.0	90	1000※2	—	3
	25TQC22MV	25	105	22	25	105	10.0	55.0	45	1500※2	—	3
	25TQC15M	25	105	15	25	105	10.0	38.0	90	1000※2	—	3
	25TQC15MV	25	105	15	25	105	10.0	38.0	45	1500※2	—	3
	20TQC47MY	20	105	47	20	105	10.0	94.0	55	1450	—	3
	20TQC22M	20	105	22	20	105	10.0	44.0	80	1300	—	3
	16TQC68MY	16	105	68	16	105	10.0	108.8	50	1500	—	3
	16TQC47M	16	105	47	16	105	10.0	75.2	70	1400	—	3
	16TQC33M	16	105	33	16	105	10.0	52.8	70	1400	—	3
D3L	25TQC33M	25	105	33	25	105	10.0	82.5	60	1400	—	3
	20TQC47M	20	105	47	20	105	10.0	94.0	55	1450	—	3
	16TQC68M	16	105	68	16	105	10.0	108.8	50	1500	—	3
D3	16TQC100M	16	105	100	16	105	10.0	160.0	50	1800	—	3

※1 100k to 500kHz,105℃ ※2 100k to 300kHz,105℃

OS-CON Line-up table Aluminum Solid Capacitors with Conductive Polymer

Classification		Series	Page	Features	Small size・Low profile	High capacitance	Low ESR	High voltage	Long life High temperature	Size code	Category temperature range (℃)	Rated voltage range (V.DC)	Capacitance range (μF)	External appearance	Marking color
Conductive polymer electrolyte	SMD type	New SVPF	32	Small size・Low profile High voltage High capacitance	●	●		●		C45	−55 to +105	25	15	—	Purple
										C6	−55 to +105	25	47		
		SVPE	33	Super low ESR High capacitance		●	●			B6	−55 to +105	2.5 to 6.3	150 to 330	—	Purple
										C45	−55 to +105	2.5 to 6.3	220 to 330		
										C6	−55 to +105	2.5 to 6.3	220 to 390		
										F12	−55 to +105	16	470		
		SVPS	34 to 35	Long life					●	A5	−55 to +105	4.0 to 10	10 to 33	—	Purple
										B6	−55 to +105	4.0 to 16	22 to 68		
										C6	−55 to +105	4.0 to 20	22 to 150		
										E7	−55 to +105	4.0 to 25	10 to 270		
										F8	−55 to +105	4.0 to 16	100 to 680		
		SVPD	36 to 37	Guaranteed at 125℃ Rated 35V max. 85℃85% RH				●	●	C6	−55 to +125	10 to 25	10 to 56	—	Purple
										E7	−55 to +125	16 to 35	8.2 to 82		
										F8	−55 to +125	25 to 35	18 to 39		
										E12	−55 to +125	25 to 35	22 to 47		
										F12	−55 to +125	25 to 35	47 to 82		
		SVPC	38 to 39	Super low ESR High capacitance		●	●			B6	−55 to +105	2.5 to 16	39 to 180	—	Purple
										C6	−55 to +105	2.5 to 16	68 to 560		
										E7	−55 to +105	2.5 to 16	120 to 680		
										E12	−55 to +105	2.5 to 16	270 to 1,500		
										F12	−55 to +105	2.5	2,700		
		SVPB	40 to 41	Low profile	●					C5	−55 to +105	2.5 to 20	15 to 120	—	Purple
										C55	−55 to +105	20	22		
		SVPA	42 to 43	Low ESR Large ripple current			●			B6	−55 to +105	2.5 to 20	10 to 82	—	Purple
										C6	−55 to +105	2.5 to 20	22 to 180		
										E7	−55 to +105	2.5 to 20	47 to 330		
										F8	−55 to +105	2.5 to 16	180 to 820		
		SVQP	44 to 45	Guaranteed at 125℃					●	C6	−55 to +125	4.0 to 20	22 to 150	—	Purple
										E7	−55 to +125	6.3 to 20	47 to 220		
		SVP	46 to 47	Standard						A5	−55 to +105	4.0 to 16	3.3 to 33	—	Purple
										B6	−55 to +105	4.0 to 20	10 to 68		
										C6※1	−55 to +105	2.5 to 25	6.8 to 220		
										E7※1	−55 to +105	4.0 to 25	10 to 330		
										F8※1	−55 to +105	4.0 to 25	22 to 680		
										E12※1	−55 to +105	2.5 to 25	33 to 680		
										F12※1	−55 to +105	2.5 to 25	56 to 1,500		
	Radial lead type	SEPC	48 to 49	Super low ESR High capacitance Small size Low profile	●	●	●			B9	−55 to +105	2.5	100 to 560	—	Purple
										C6	−55 to +105	2.5 to 16	100 to 390		
										C9	−55 to +105	2.5 to 16	100 to 820		
										E9	−55 to +105	2.5 to 16	180 to 1,000		
										E12	−55 to +105	16	180 to 270		
										E13	−55 to +105	2.5 to 6.3	470 to 820		
										F13	−55 to +105	2.5 to 6.3	470 to 2,700		
		SEQP	50 to 51	105℃ 5,000h Guaranteed at 125℃ Rated 32V max.				●	●	C6	−55 to +125	4.0 to 20	22 to 150	—	Purple
										E7	−55 to +125	4.0 to 32	6.8 to 330		
										F8	−55 to +125	4.0 to 32	15 to 680		
										E12	−55 to +125	4.0 to 32	18 to 560		
										F13	−55 to +125	4.0 to 20	150 to1,200		
		SEP	52 to 53	Standard						C6※1	−55 to +105	4.0 to 25	6.8 to 150	—	Purple
										E7※1	−55 to +105	4.0 to 25	10 to 330		
										F8※1	−55 to +105	4.0 to 25	22 to 680		
										E12※1	−55 to +105	2.5 to 25	33 to 680		
										F13※1	−55 to +105	2.5 to 25	56 to 1,500		

Aluminum Solid Capacitors with Organic Semiconductive Electrolyte

Classification		Series	Page	Features	Small size・Low profile	High capacitance	Low ESR	High voltage	Long life High temperature	Size code	Category temperature range (℃)	Rated voltage range (V.DC)	Capacitance range (μF)	External appearance	Marking color
Organic semiconductor electrolyte	Radial lead type	SF	54 to 55	5mm height max.	●					E1	−55 to +105	4.0 to 6.3	150 to 220	Purple	White
		SP	56 to 57	Low ESR High capacitance (Audio system)		●	●			C'	−55 to +105	4.0 to 25	6.8 to 100	Purple	White
										E'	−55 to +105	4.0 to 20	47 to 220		
										F'	−55 to +105	4.0 to 20	68 to 330		
										C	−55 to +105	4.0 to 25	10 to 150		
										D※2	−55 to +105	4.0 to 25	18 to 270		
										E	−55 to +105	4.0 to 25	33 to 560		
										F	−55 to +105	2.0 to 25	56 to 1,200		
										Fo	−55 to +105	2.0 to 4.0	1,500 to 1,800		
										G	−55 to +105	4.0	2,200		
		SC	58 to 59	Standard						A	−55 to +105	6.3 to 30	1.0 to 6.8	Purple	White
										B	−55 to +105	6.3 to 30	1.5 to 15		
										C	−55 to +105	6.3 to 30	3.3 to 33		
										D	−55 to +105	10 to 30	4.7 to 47		
										E	−55 to +105	25 to 30	10 to 22		
										F	−55 to +105	25 to 30	22 to 47		
		SA	60 to 61	High capacitance Small size	●	●				C	−55 to +105	6.3 to 20	15 to 47	Purple	White
										D	−55 to +105	10 to 20	33 to 68		
										E	−55 to +105	6.3 to 20	47 to 150		
										F	−55 to +105	6.3 to 20	100 to 330		
										G	−55 to +105	16	470		
										H	−55 to +105	6.3 to 16	1,000 to 2,200		
		SL	62 to 63	Low profile	●					A'	−55 to +105	6.3 to 25	1 to 6.8	Purple	White
										B'	−55 to +105	6.3 to 25	2.2 to 15		
										C'	−55 to +105	10 to 25	4.7 to 47		
										E'	−55 to +105	4.0 to 25	15 to 150		
										F'	−55 to +105	4.0 to 25	22 to 220		
		SH	64 to 65	Long life Guaranteed for 5,000h					●	A	−55 to +105	6.3 to 25	1.0 to 6.8	Purple	White
										B	−55 to +105	6.3 to 25	2.2 to 15		
										C	−55 to +105	6.3 to 25	4.7 to 47		
										D	−55 to +105	10 to 25	15 to 68		
										E	−55 to +105	6.3 to 20	47 to 150		
										F	−55 to +105	6.3 to 20	100 to 330		
		SS	66 to 67	Small size	●					A'	−55 to +105	6.3 to 20	2.2 to 15	Purple	White
										B'	−55 to +105	6.3 to 20	4.7 to 33		
										C'	−55 to +105	4.0 to 20	10 to 68		
										D	−55 to +105	4.0 to 20	47 to 150		
										E	−55 to +105	6.3 to 20	100 to 220		
										F	−55 to +105	4.0 to 20	150 to 470		

※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.

※2 D size is indicated to SPS series.

POSCAP Line-up table Tantalum Solid Capacitors with Conductive Polymer

Classification		Series	Page	Features	Small size・Low profile	High capacitance	Low ESR	Low ESL	High voltage High reliability	Size code	Category temperature range (℃)	Rated voltage range (V.DC)	Capacitance range (μF)	L×W (mm)	H (mm)
Conductive polymer electrolyte	SMD type	TPSF	86	Low ESR・Small size High capacitance Face down terminal	●	●	●			B2S	−55 to +105	2.0 to 10	62 to 270	3.5×2.8	1.9
		TPU	87	Small size Low profile Face down terminal	●					S09	−55 to +85	2.5 to 10	4.7 to 47	2.0×1.25	0.9
										S11	−55 to +85	2.5 to 6.3	33 to 68	2.0×1.25	1.1
										A09	−55 to +85	2.5 to 10	33 to 100	3.2×1.6	0.9
										B09	−55 to +85	6.3	150	3.5×2.8	0.9
		TPL TPLF	88 to 89	Low ESR Low ESL Face down terminal			●	●		D12T	−55 to +105	2.0 to 6.3	100 to 220	7.3×4.3	1.1
										D15T	−55 to +105	2.5 to 6.3	150 to 330	7.3×4.3	1.4
										D2T	−55 to +105	2.0 to 2.5	220 to 560	7.3×4.3	1.8
		TPF	90	Low ESR High capacitance		●	●			D3L	−55 to +105	2.5 to 10	150 to 680	7.3×4.3	2.8
										D2E	−55 to +105	2.0	220 to 330	7.3×4.3	1.8
		TPG	91	Small size Low profile High capacitance	●	●				B15G	−55 to +105	4.0 to 6.3	150 to 220	3.5×2.8	1.4
										B1G	−55 to +105	2.5 to 12.5	33 to 220	3.5×2.8	1.1
		TPE	92 to 95	Low ESR			●			B2	−55 to +105	2.0 to 10	47 to 330	3.5×2.8	1.9
										C2	−55 to +105	2.5 to 8.0	100 to 330	6.0×3.2	1.8
										C3	−55 to +105	6.3 to 10	150 to 220	6.0×3.2	2.5
										D2E	−55 to +105	2.0 to 10	68 to 470	7.3×4.3	1.8
										D3L	−55 to +105	2.5 to 10	220 to 680	7.3×4.3	2.8
										D4	−55 to +105	2.5 to 10	330 to 1,500	7.3×4.3	3.8
		TPB	96 to 97	Standard						B2	−55 to +105	2.5 to 10	33 to 150	3.5×2.8	1.9
										C	−55 to +105	2.5 to 10	47 to 220	6.0×3.2	2.8
										D3L	−55 to +105	4.0 to 10	100 to 330	7.3×4.3	2.8
										D4	−55 to +105	6.3 to 10	220 to 470	7.3×4.3	3.8

Classification		Series	Page	Features	Small size・Low profile	High capacitance	Low ESR	Low ESL	High voltage High reliability	Size code	Category temperature range (℃)	Rated voltage range (V.DC)	Capacitance range (μF)	L×W (mm)	H (mm)
Conductive polymer electrolyte	SMD type	TPC	98 to 99	Low profile	●					B1	−55 to +105	2.5 to 12.5	10 to 56	3.5×2.8	1.1
										C1	−55 to +105	2.5 to 8.0	33 to 100	6.0×3.2	1.4
										D2	−55 to +105	6.3 to 10	68 to 330	7.3×4.3	1.9
		TPD	100	Low ESR High capacitance		●	●			D4D	−55 to +105	2.5 to 6.3	470 to 1,000	7.3×4.3	3.6
		TA	101	High reliability (for the car electronics)					●	B2	−55 to +105	4.0 to 10	47 to 100	3.5×2.8	1.9
										D2E	−55 to +105	2.5 to 10	68 to 470	7.3×4.3	1.8
										D3L	−55 to +105	2.5 to 10	220 to 680	7.3×4.3	2.8
		TH	102 to 103	Guaranteed at 125℃					●	D3L	−55 to +125	2.5 to 10	100 to 470	7.3×4.3	2.8
										D4	−55 to +125	2.5 to 10	220 to 1,000	7.3×4.3	3.8
										D2	−55 to +125	2.5 to 10	68 to 220	7.3×4.3	1.9
										D2E	−55 to +125	2.5 to 6.3	150 to 330	7.3×4.3	1.8
										D4D	−55 to +125	2.5 to 6.3	330 to 680	7.3×4.3	3.6
		TQC	104	High voltage					●	B2	−55 to +105	16 to 25	5.6 to 15	3.5×2.8	1.9
										C	−55 to +105	16 to 25	10 to 22	6.0×3.2	2.8
										D2	−55 to +105	16 to 35	10 to 68	7.3×4.3	1.9
										D3L	−55 to +105	16 to 25	33 to 68	7.3×4.3	2.8
										D3	−55 to +105	16	100	7.3×4.3	3.1

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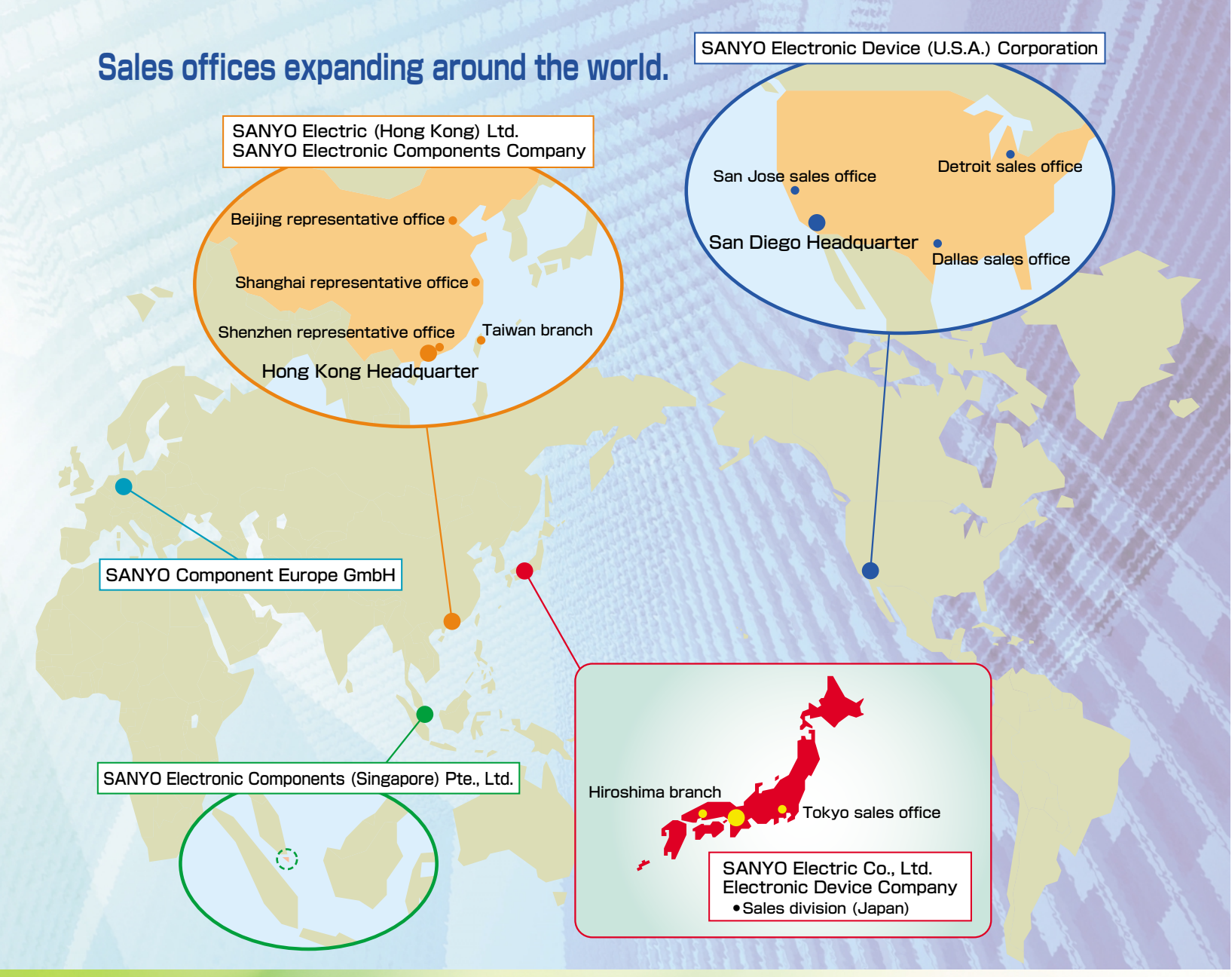

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