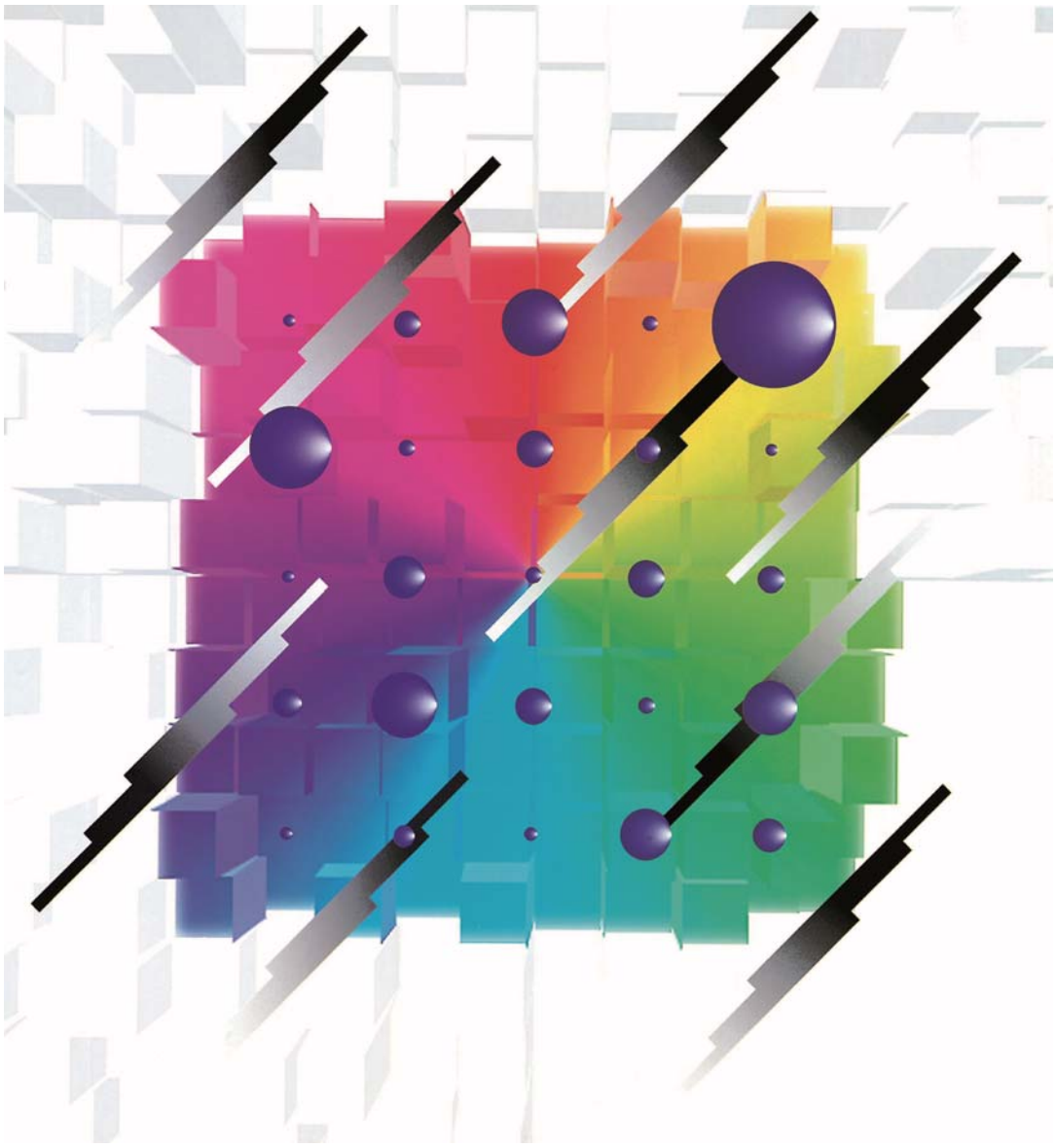
Panasonic

2017

Products Catalog

POSCAP

Conductive Polymer Tantalum Solid Capacitors



2017.04 | http://industrial.panasonic.com/ww/products/capacitors/polymer-capacitors/poscap

Notices

■ Applicable Laws and Regulations

- This product complies with the RoHS Directive (Restriction of the use of certain Hazardous substances in electrical and electronic equipment (DIRECTIVE 2011/65/EU).
- No Ozone Depleting Chemicals(ODC's), controlled under the Montreal Protocol Agreement, are used in producing this product.
- We do not PBBs or PBDEs as brominated flame retardants.
- Export procedure which followed export related regulations, such as foreign exchange and a foreign trade method, on the occasion of export of this product Thank you for your consideration.

■ Limited applications

- This capacitor is designed to be used for electronics circuits such as audio/visual equipment, home appliances, computers and other office equipment, optical equipment, measuring equipment.
- High reliability and safety are required [be / a possibility that incorrect operation of this product may do harm to a human life or property] more. When use is considered by the use, the delivery specifications which suited the use separately need to be exchanged.

Items to be observed

- This specification guarantees the quality and performance of the product as individual components. Before use, check and evaluate their compatibility with installed in your products.
- Do not use the products beyond the specifications described in this document.

■ For specifications

- Install the following systems for a failsafe design to ensure safety if these products are to be used in equipment where a defect in these products may cause the loss of human life or other signification damage, such as damage to vehicles (automobile, train, vessel), traffic lights, medical equipment, aerospace equipment, electric heating appliances, combustion/ gas equipment, rotating rotating equipment, and disaster/crime prevention equipment.
  - · The system is equipped with a protection circuit and protection device.
  - · The system is equipped with a redundant circuit or other system to prevent an unsafe status in the event of a single fault.

■ Conditions of use

- Before using the products, carefully check the effects on their quality and performance, and determined whether or not they can be used. These products are designed and manufactured for general-purpose and standard use in general electronic equipment. These products are not intended for use in the following special conditions.
  - (1) In liquid, such as Water, Oil, Chemicals, or Organic solvent.
  - (2) In direct sunlight, outdoors, or in dust.
  - (3) In vapor, such as dew condensation water of resistive element, or water leakage, salty air, or air with a high concentration corrosive gas, such as Cl_2, H_2S, NH_3, SO_2, or NOx.
  - (4) In an environment where strong static electricity or electromagnetic waves exist.
  - (5) Mounting or placing heat-generating components or inflammables, such as vinyl-coated wires, near these products.
  - (6) Sealing or coating of these products or a printed circuit board on which these products are mounted, with resin and other material.
  - (7) Using resolvent, water or water-soluble cleaner for flux cleaning agent after soldering. (In particular, when using water or a water-soluble cleaning agent, be careful not to leave water residues)
  - (8) Using in the atmosphere which strays Acid or alkaline.
  - (9) Using in the atmosphere which there are excessive vibration and shock.
- Please arrange circuit design for preventing impulse or transitional voltage. Do not apply voltage, which exceeds the full rated voltage when the capacitors receive impulse voltage, instantaneous high voltage, high pulse voltage etc.
- Our products there is a product are using an electrolyte solution. Therefore, misuse can result in rapid deterioration of characteristics and functions of each product. Electrolyte leakage damages printed circuit and affects performance, characteristics, and functions of customer system.

⚠ Guidelines and precautions (POSCAP)

1. Circuit design

1.1 Prohibited circuits

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

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

1.2 Failure and life-span

The failure rate is 0.5 %* / 1000 h (Confidence level : 60 %) based on JIS C 5003.
The mainly failure modes are as follows.
✻ B2 size or less : 1.0 %

1.2-1 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.
In case a short circuit occurs, ensure safety by fully considering the followings.

(1) If POSCAP emit smoke, turn off the main power of the equipment. In this case, keep your face and hands away from the area.
(2) It may take a few seconds to a few minutes before POSCAP emits smoke by the situation. Increase safety by using a protective circuit.
(3) If the smoke comes into eyes, rinse immediately. If the smoke is inhaled, gargle immediately.
(4) 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.

1.2-2 Wear-out failure (lifetime)

When lifetime 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.

1.3 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 environment temperature, ripple current and applied voltage.
Failure rate
In the case of the endurance which is 105 °C 2000 h.
0.5 %/1000 h (Environment temp. : 105 °C, Rated voltage or Category voltage applied)
In the case of the endurance which is 105 °C 1000 h or 125 °C 1000 h.
1.0 %/1000 h (Environment temp. : 105 °C, Rated voltage or Category voltage applied)
In the case of the endurance which is 85 °C 1000 h.
1.0 %/1000 h (Environment temp. : 85 °C, Rated voltage applied)

1.4 Check the rated performance

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

1.5 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 apply current that exceeds the allowable ripple current. Ripple current should be controlled so that surface temperature of a capacitor do not exceed the rated temperature.
(For questions regarding TQC series, please contact us.)

1.6 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.

1.7 Rapid charge and discharge limitation

Rapid charge and discharge are restricted (for maintainance of high-proof reliability).
A protective circuit is recommended for when a rapid charge or discharge causes excessive rush current since this is main cause of short circuit and large leakage current. Use a protective circuits in case the rush current value exceeds 20 A*.
Be sure to insert a protection resistor of about 1 kΩ for charge and discharge when measuring the leakage current.
✻When TH series use under the ambient temperature more than 105 °C : 10 A
TPU series : 10 A

2. Mounting

2.1 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 protective circuit and a protective device are set up, so as to make the system safer.
- A diffuse circuit and so on is set up, so as to make the system safer such as that a machine may not break down as to the single trouble.

2.2 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 degradation of electric characteristic and lifetime when soldering is conducted under conditions that are harsher that those stipulated.

2.3 Others

POSCAP's Electrical characteristics are affected by temperature and frequency fluctuations.
Design circuits after checking the amount of fluctuation.

3. Storage

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 make storage of POSCAP sealing up in the reel and storage bag at the time of delivery in the following environment. Also, set storage period as 18 months or shorter.
Room temperature and room humidity (generally : 15 to 35 °C, 45 to 75% RH) are desirable.
Place where POSCAP is not exposed by direct sunshine.
Please unseal storage bag just before mounting and be conscious that POSCAP in the storage bag is used up.
When remainder unfortunately occurs, return them to the storage bag once again and, please seal the unsealed part by adhesive tape etc., including desiccants. Moreover, once and use it in time the storage bag is opened, store POSCAP according to the table's Floor Life "Time" and "conditions".

MSL	Floor life	
	Time	Conditions
2a	4 weeks	≦ 30 °C/60 %Rh
3	168 hours	≦ 30 °C/60 %Rh
5	48 hours	≦ 30 °C/60 %Rh

(Conform to IPC/JEDEC J-STD-020)

◇ Intellectual property right

We, Panasonic Group are providing the product and service that customers can use without anxiety, and are working positively on the protection of our products under intellectual property rights.
Representative patents relating to POSCAP are as follows:

US Patent Nos. 6168639 and 6313979

Line up

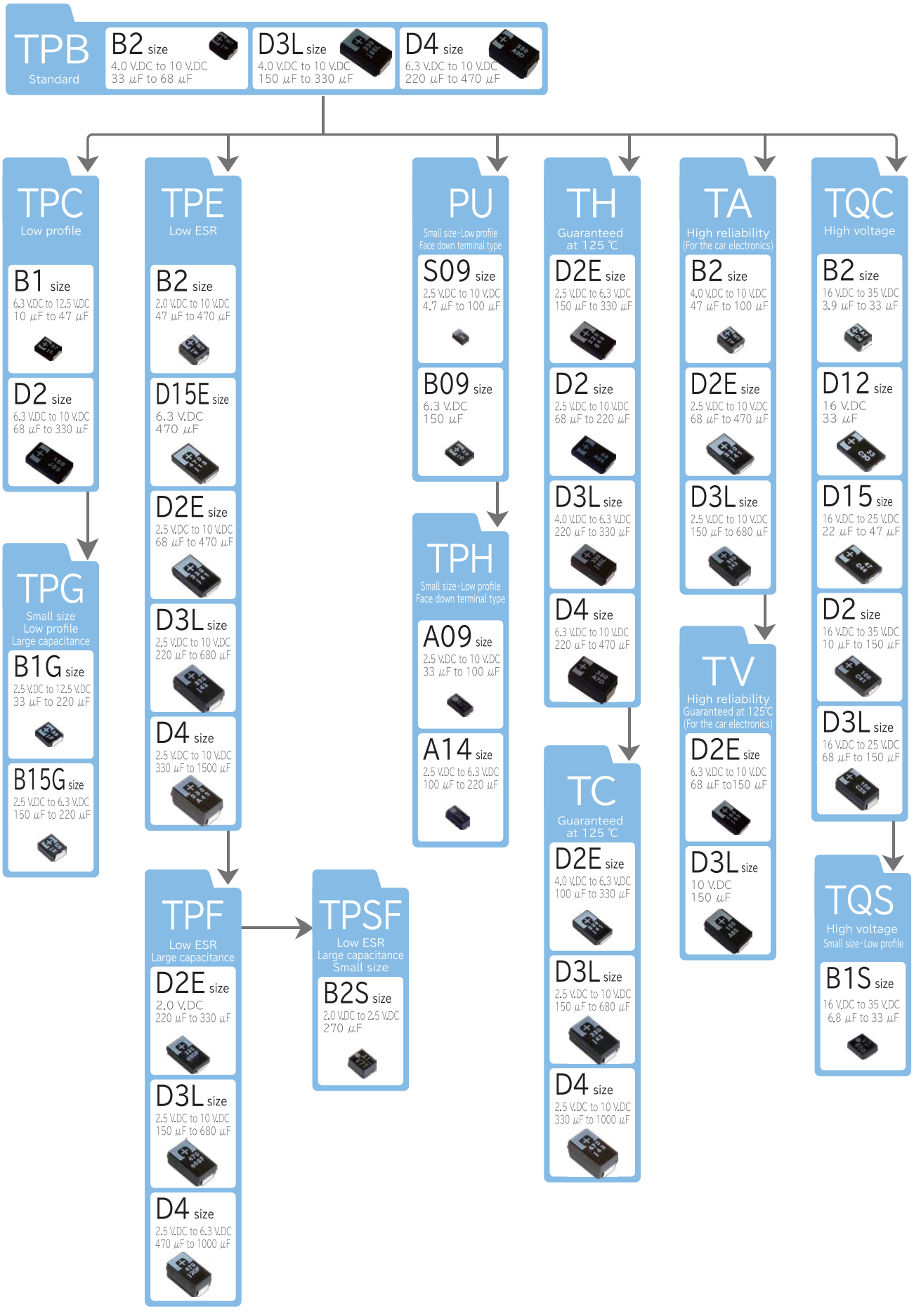
Series	Features	Small size/Low profile	Large capacitance	Low ESR	For automotive	High voltage	Guaranteed at 125 ℃	Category temperature range (℃)	Rated voltage (V.DC)	ESR (mΩ)	Capacitance (μF)	Size code	Size (mm) L	W	H
TPU	Small size Low profile Face down terminal	●						-55 to 85	2.5 to 10	150 to 300	4.7 to 100	S09	2.0	1.25	0.9
								-55 to 85	6.3	100	150	B09	3.5	2.8	0.9
TPH	Small size Low profile Face down terminal	●		●				-55 to 85	6.3 to 10	100 to 150	33 to 100	A09	3.2	1.6	0.9
								-55 to 105	2.5 to 6.3	150	47 to 100	A09	3.2	1.6	0.9
								-55 to 85	2.5 to 6.3	70	100 to 220	A14	3.2	1.6	1.4
TPG	Small size Low profile Large capacitance	●	●					-55 to 105	2.5 to 12.5	35 to 70	33 to 220	B1G	3.5	2.8	1.1
								-55 to 105	2.5 to 6.3	30 to 70	150 to 220	B15G	3.5	2.8	1.4
TPSF	Low ESR / Small size Large capacitance Face down terminal	●	●	●				-55 to 105	2.0 to 2.5	6 to 9	270	B2S	3.5	2.8	1.9
TPE	Low ESR			●				-55 to 105	2.0 to 10	11 to 35	47 to 470	B2	3.5	2.8	1.9
								-55 to 105	6.3	35	470	D15E	7.3	4.3	1.4
								-55 to 105	2.5 to 10	7 to 25	68 to 470	D2E	7.3	4.3	1.8
								-55 to 105	2.5 to 10	9 to 25	220 to 680	D3L	7.3	4.3	2.8
								-55 to 105	2.5 to 10	10 to 25	330 to 1500	D4	7.3	4.3	3.8
TPF	Low ESR Large capacitance		●	●				-55 to 105	2.0	6	220 to 330	D2E	7.3	4.3	1.8
								-55 to 105	2.5 to 10	5 to 15	150 to 680	D3L	7.3	4.3	2.8
								-55 to 105	2.5 to 6.3	5 to 10	470 to 1000	D4	7.3	4.3	3.8
TA	High reliability (for the car erectronics)					●		-55 to 105	4.0 to 10	70	47 to 100	B2	3.5	2.8	1.9
								-55 to 105	2.5 to 10	9 to 25	68 to 470	D2E	7.3	4.3	1.8
								-55 to 105	2.5 to 10	15 to 25	150 to 680	D3L	7.3	4.3	2.8
TV	High reliability Guaranteed at 125 ℃ (for the car erectronics)					●	●	-55 to 125	6.3 to 10	25	6 to 150	D2E	7.3	4.3	1.8
								-55 to 125	10	25	150	D3L	7.3	4.3	2.8

Line up

Series	Features	Small size/Low profile	Large capacitance	Low ESR	For automotive	High voltage	Guaranteed at 125 ℃	Category temperature range (℃)	Rated voltage (V.DC)	ESR (mΩ)	Capacitance (μF)	Size code	Size (mm) L	W	H
TQC	High voltage							-55 to 105	16 to 35	90 to 400	3.9 to 33	B2	3.5	2.8	1.9
								-55 to 105	16	40	33	D12	7.3	4.3	1.15
						●		-55 to 105	16 to 25	55 to 70	22 to 47	D15	7.3	4.3	1.4
								-55 to 105	16 to 35	40 to 150	10 to 150	D2	7.3	4.3	1.9
								-55 to 105	16 to 25	50 to 70	68 to 150	D3L	7.3	4.3	2.8
TQS	High voltage Small size / Low profile	●				●		-55 to 105	16 to 35	100 to 150	6.8 to 33	B1S	3.5	2.8	1.1
TPB	Standard							-55 to 105	4.0 to 10	70	33 to 68	B2	3.5	2.8	1.9
								-55 to 105	4.0 to 10	40	150 to 330	D3L	7.3	4.3	2.8
								-55 to 105	6.3 to 10	35 to 40	220 to 470	D4	7.3	4.3	3.8
TPC	Low profile	●						-55 to 105	6.3 to 12.5	55 to 80	10 to 47	B1	3.5	2.8	1.1
								-55 to 105	6.3 to 10	40 to 45	68 to 330	D2	7.3	4.3	1.9
TH	Guaranteed at 125 ℃						●	-55 to 125	2.5 to 6.3	15 to 25	150 to 330	D2E	7.3	4.3	1.8
								-55 to 125	2.5 to 10	40 to 45	68 to 220	D2	7.3	4.3	1.9
								-55 to 125	4.0 to 6.3	40	220 to 330	D3L	7.3	4.3	2.8
								-55 to 125	6.3 to 10	35 to 40	220 to 470	D4	7.3	4.3	3.8
TC	Guaranteed at 125 ℃						●	-55 to 125	4.0 to 6.3	15 to 25	100 to 330	D2E	7.3	4.3	1.8
								-55 to 125	2.5 to 10	5 to 25	150 to 680	D3L	7.3	4.3	2.8
								-55 to 125	2.5 to 10	5 to 25	330 to 1000	D4	7.3	4.3	3.8

Conductive Polymer Tantalum Solid Capacitors

Diagram



Explanation of part numbers

Part number system

2R5 Rated voltage 1 to 3 figures

Rated voltage	Code
2.0	2
2.5	2R5 or E
4.0	4
6.3	6
8.0	8
10	10
11	11
12.5	12
16	16 or 1C
20	20
25	25
35	35

TPB Series name 3 to 4 figures

Series	Code
TPB	TPB
TPC	TPC
TPE	TPE
TPF	TPF
TPG	TPG
TPH	TPH
TPSF	TPSF
TPU	TPU
TAB	TAB
TAE	TAE
THB	THB
THC	THC
THE	THE
TQC	TQC
TQS	TQS
TVE	TVE
TCE	TCE
TCF	TCF

330 Rated capacitance 2 to 4 figures

Rated capacitance	Code
2.7	2R7
3.9	3R9
4.7	4R7
5.6	5R6
6.8	6R8
8.2	8R2
10	10
15	15
22	22
33	33
47	47
56	56
68	68
82	82
100	100
120	120
150	150
220	220
270	270
330	330
470	470
680	680
1,000	1000
1,500	1500

M Capacitance tolerance 1 figure

Capacitance tolerance	Code
±20%	M

L Special code 0 to 4 figures

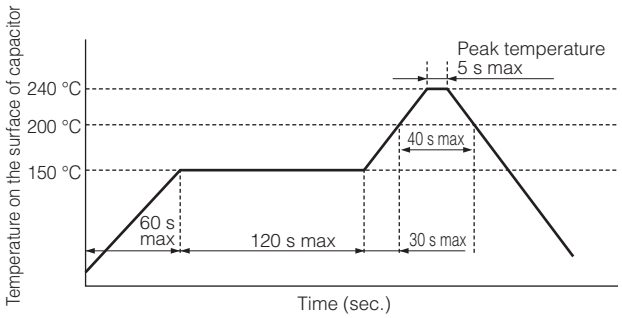
Standard		Code
TPE series		
B2 size	ESR 35mΩ max	ZB
	ESR 25mΩ max	PB
	ESR 21mΩ max	LB
	ESR 15mΩ max	FB
	ESR 15mΩ/300kHz max	FGB
	ESR 35mΩ max 85℃	AZB
	ESR 25mΩ max 85℃	APB
	ESR 15mΩ max 85℃	AFB
	ESR 13mΩ/300kHz max 85℃	ADGB
	ESR 11mΩ/300kHz max 85℃	AJGB
D15E size	ESR 35mΩ max 85℃	AZU
D2E size	ESR 25mΩ max 85℃	AP
D3L size	ESR 25mΩ max	L
	ESR 18mΩ max	IL
	ESR 15mΩ max	FL
	ESR 12mΩ max	CL
	ESR 10mΩ max	AL
	ESR 25mΩ max 85℃	AL
	ESR 9mΩ/500kHz max 85℃	A9EL
TPG series		
B1G size	ESR 35mΩ/300kHz max.	ZGD
TPH series		
A09 size	ESR 150mΩ max	AHA
	ESR 100mΩ max	AEA
A14 size	ESR 70mΩ max	ABC
TPB series		
D3L size		L
TPC series		
85℃		A
B1 size		B

Standard		Code
TPF series		
D3L size	ESR 9mΩ max	9L
	ESR 7mΩ max	7L
	ESR 6mΩ max	6L
	ESR 5mΩ max	5L
D4 size	ESR 10mΩ max	AH
	ESR 6mΩ max	6H
	ESR 5mΩ max	5H
TPU series		
S09 size		SI
B09 size		BI
TQC series		
Capacitance enlarged type		YF
Capacitance enlarged type(B size)		YFB
Capacitance enlarged type(D12 size)		YFS
Capacitance enlarged type(D15 size)		YFT
Capacitance enlarged type(D2 size)		YFD/D2
TQS series		
ESR 70 mΩ max		BD
ESR 100 mΩ max		ED
ESR 150 mΩ max		HD
All series		
ESR 55mΩ max		G
ESR 45mΩ max		V
ESR 40mΩ max		W
ESR 35mΩ max		Z
ESR 18mΩ max		I
ESR 15mΩ max		F
ESR 12mΩ max		C
ESR 9mΩ max		9
ESR 7mΩ max		7
ESR 6mΩ max		6
ESR 5mΩ max		5
ESR 35mΩ/300kHz max		ZG
ESR 30mΩ/300kHz max		UG
ESR 9mΩ/300kHz max		9G
ESR 6mΩ/500kHz max		6E
ESR 4mΩ/500kHz max		4E

Mounting specifications

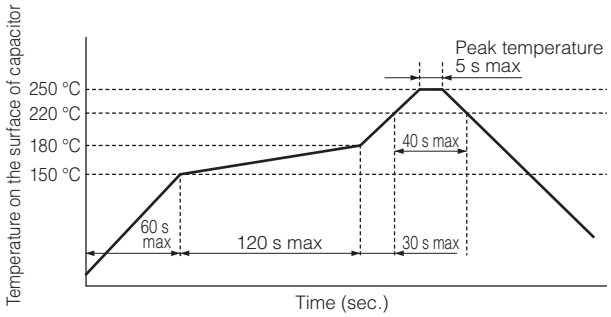
● Recommendable reflow soldering

<Recommended reflow soldering temperature profile>



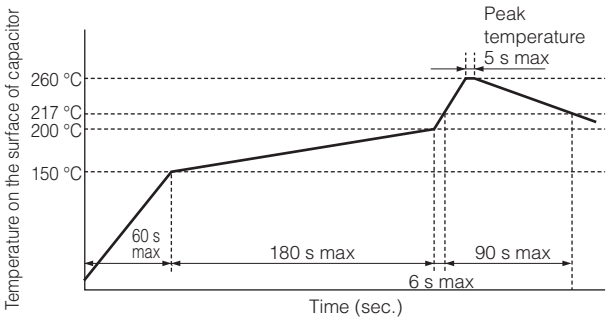
The cycles of reflow soldering : Twice (max)

<Peak temperature 250 °C lead free reflow soldering profile>



The cycles of reflow soldering : Twice (max)

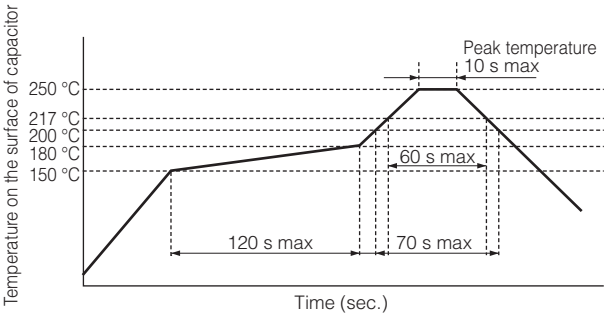
<Peak temperature 260 °C lead free reflow soldering profile>



The model of MSL “2a” is changed into MSL “3” with this reflow condition.

The cycles of reflow soldering : Twice (max)

<TQC/TQS series>

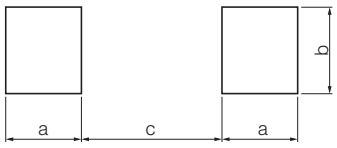


The cycles of reflow soldering : Twice (max)

● Soldering with a soldering iron

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

Land Pattern

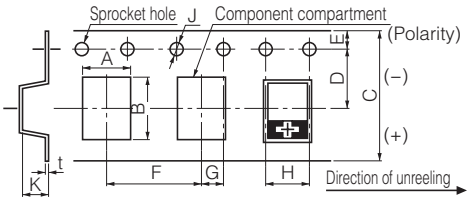


Unit : mm

Size code	a	b	c
S09	1.0	0.9	0.6
A09, A14	1.6	1.4	1.0
B09, B1, B1S, B1G, B15G, B2, B2S	1.6	2.7	1.4
D12, D15, D15E, D2E, D2, D3L, D4	2.4	2.9	3.7

Packing specifications

● Dimension of carrier tape

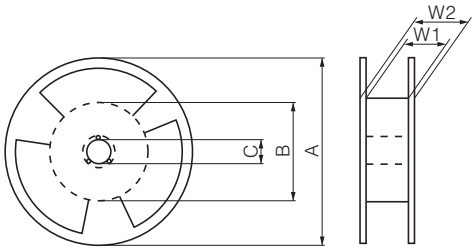


Unit : mm

Size code	A±0.1	B±0.1	C±0.3	D±0.05	E±0.1	F±0.1	G±0.05	H±0.1	$J^{+0.1}_{0}$	K±0.1	t±0.05
S09	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
A14	2.05	3.65	8.0	3.5	1.75	4.0	2.0	4.0	φ1.5	1.7	0.25
B09	3.2	3.8	8.0	3.5	1.75	4.0	2.0	4.0	φ1.5	1.4	0.25
B1	3.2	3.8	8.0	3.5	1.75	4.0	2.0	4.0	φ1.5	1.4	0.25
B1S	3.25	3.9	8.0	3.5	1.75	4.0	2.0	4.0	φ1.5	1.7	0.25
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	0.25
B2S	3.25	4.0	8.0	3.5	1.75	4.0	2.0	4.0	φ1.5	2.1	0.25
D12	4.5	7.5	12.0	5.5	1.75	8.0	2.0	4.0	φ1.5	1.7	0.3
D15	4.5	7.5	12.0	5.5	1.75	8.0	2.0	4.0	φ1.5	2.4	0.3
D15E	4.7	7.8	12.0	5.5	1.75	8.0	2.0	4.0	φ1.5	1.7	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
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
D4	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±10 µm Width of cover tape : 9.5±0.2 mm 5.5±0.2 mm (φ180 reel)

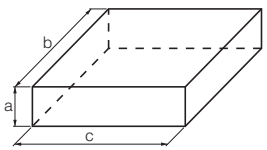
● Reel dimension



Unit : mm

A	B	C	W1	W2
φ330±2	φ80±2	φ13.0±0.2	13.5±0.5	17.5±1.0
$\phi180\ ^{0}_{-3}$	φ60±2	φ13.0±0.2	9.0±0.5	11.4±1.0

● Dimension of packing case



Unit : mm

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

● Minimum packing quantity and weight

Size code	Quantity (pcs./Reel, φ180)	Typical weight (g)
S09, A09	3000	200
A14	2500	200
B09, B1	3000	200
B1S, B1G	2500	200
B15G	2500	200
B2, B2S	2000	200

Size code	Quantity (pcs./Reel, φ330)	Typical weight (g)
D12	4500	1200
D15	3000	1000
D15E	4000	1000
D2E, D2	3000	1000
D3L	2500	1100
D4	2000	1200

✻ Small order quantity (500 pcs/reel) is available with TPE, TPF and TQC series. Please contact our sales representative if you prefer it.

● Units per packing case

Size code	Pieces/case
S09, A09	15000
A14	12500
B09, B1	15000
B1S, B1G	12500
B15G	12500
B2, B2S	10000

Size code	Pieces/case
D12	22500
D15	15000
D15E	20000
D2E, D2	15000
D3L	12500
D4	10000

Surface Mount Type

POSCAP

Series : **TPU**

Features

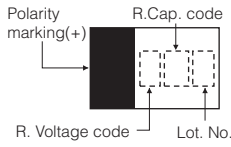
- Small size, Low profile (L2.0 × W 1.25 × H 0.9 mm)
- Face down terminal type
- RoHS compliance, Halogen free

Specifications

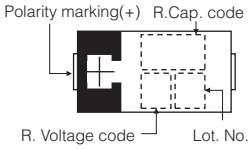
Size code	S09	B09
Category temperature range	–55 °C to +85 °C	
Rated voltage range	2.5 V.DC to 10 V.DC	6.3 V.DC
Category voltage range	2.5 V.DC to 10 V.DC	6.3 V.DC
Rated capacitance range	4.7 µF to 100 µF	150 µF
Capacitance tolerance	±20 % (120 Hz / + 20 °C)	
Leakage current	Please see the attached characteristics list	
Dissipation factor (tan δ)	Please see the attached characteristics list	
Surge voltage (V.DC)	Rated voltage × 1.15	
Endurance	+85 °C, 1000 h, rated voltage applied	
	Capacitance change	Within ±20 % of the initial value
	tan δ	≦ 1.5 times of the initial limit
	DC leakage current	Within the initial limit
Damp heat (Steady State)	+60 °C, 90 % to 95 %, 500 h, No-applied voltage	
	Capacitance change	Within +40 %, –20 % of the initial value
	tan δ	≦ 1.5 times of the initial limit
	DC leakage current	≦ 3 times of the initial limit

Marking

S09 Size



B09 Size



R. Voltage (V.DC)	2.5	4.0	6.3	10.0
Code	e	g	j	A

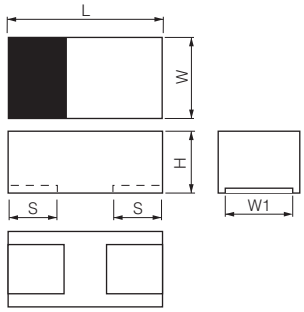
S09 Size

R. Cap. (µF)	4.7	10	22	47	68	100
Code	s	A	J	S	W	A

B09 Size

R. Cap. (µF)	150
Code	E8

Dimensions (not to scale)



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
B09	3.5	2.8	0.9	0.8	2.2

✻ Externals of figure are the reference. ✻1 ±0.2 : B09

Characteristics list

Series	Rated voltage (V.DC)	Rated temp. (°C)	Category voltage (V.DC)	Category temp. (°C)	Rated capacitance (µF)	Case size (mm) L	W	H	Size code	Specifications Ripple *1 current (mArr.m.s.)	ESR *2 (mΩ max.)	tan δ *3	LC *4 (µA)	Standard Part number	Min. Packaging Q'ty (pcs)
TPU	2.5	85	2.5	85	47	2.0	1.25	0.9	S09	510	150	0.10	23.5	2R5TPU47MSI	3000
		85	2.5	85	100	2.0	1.25	0.9		510	150	0.10	50.0	ETPU100MSI	3000
	4	85	4.0	85	68	2.0	1.25	0.9		510	150	0.10	54.4	4TPU68MSI	3000
	6.3	85	6.3	85	10	2.0	1.25	0.9		400	250	0.10	6.3	6TPU10MSI	3000
		85	6.3	85	22	2.0	1.25	0.9		510	150	0.10	27.7	6TPU22MSI	3000
		85	6.3	85	47	2.0	1.25	0.9		510	150	0.10	59.2	6TPU47MSI	3000
		85	6.3	85	150	3.5	2.8	0.9	B09	670	100	0.10	94.5	6TPU150MBI	3000
	10	85	10.0	85	4.7	2.0	1.25	0.9	S09	360	300	0.10	4.7	10TPU4R7MSI	3000

✻1 Ripple current (100 kHz/ +45 °C), ✻2 ESR (100 kHz/+20 °C) ✻3 tan δ (120 Hz/+20 °C) ✻4 After 5 minutes

◆ Please refer to each page in this catarog for “Reflow conditions” and “Taping specifications”.

Surface Mount Type

POSCAP

Series : **TPH**

Features

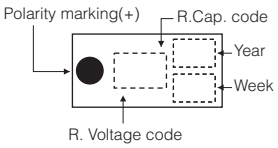
- Small size, Low profile (L3.2 × W 1.6 × H 0.9 mm)
- Face down terminal type
- RoHS compliance, Halogen free

Specifications

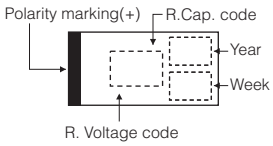
Size code	A09	A14
Category temperature range	–55 °C to +105 °C / –55 °C to +85 °C (Rated temp. +85 °C)	
Rated voltage range	2.5 V.DC to 10 V.DC	2.5 V.DC to 6.3 V.DC
Category voltage range	2.5 V.DC to 10 V.DC	2.5 V.DC to 6.3 V.DC
Rated capacitance range	33 µF to 100 µF	100 µF to 220 µF
Capacitance tolerance	±20 % (120 Hz / + 20 °C)	
Leakage current	Please see the attached characteristics list	
Dissipation factor (tan δ)	Please see the attached characteristics list	
Surge voltage (V.DC)	Rated voltage × 1.15	
Endurance	+105 °C, 1000 h rated voltage applied ✻ Rated temp, +85 °C Products : +85 °C, 1000 h, rated voltage applied	
	Capacitance change	Within ±20 % of the initial value
	tan δ	≦ 1.5 times of the initial limit
	DC leakage current	Within the initial limit
Damp heat (Steady State)	+60 °C, 90 % to 95 %, 500 h, No-applied voltage	
	Capacitance change	Within +50 %, –20 % of the initial value (ETPH220MABC)
		Within +40 %, –20 % of the initial value (Except for above model)
	tan δ	≦ 1.5 times of the initial limit
	DC leakage current	≦ 3 times of the initial limit

Marking

A09/A14 Size



A09 Size (6TPH100MAEA)

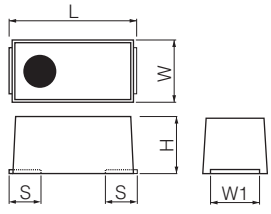


R. Voltage (V.DC)	2.5	4.0	6.3	10.0
Code	e	g	j	A

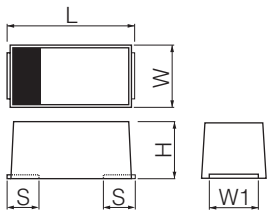
R. Cap. (µF)	33	47	68	100	150	220
Code	N7	S7	W7	A8	E8	J8

Dimensions (not to scale)

A09/A14 Size



A09 Size (6TPH100MAEA)



Unit : mm

Size code	L±0.2	W±0.2	H±0.1	S±0.2	W1±0.1
A09	3.2	1.6	0.9	0.8	1.2
A14	3.2	1.6	1.4	0.8	1.2

✻ Externals of figure are the reference.

Characteristics list

Series	Rated voltage (V.DC)	Rated temp. (°C)	Category voltage (V.DC)	Category temp. (°C)	Rated capacitance (µF)	Case size (mm) L	W	H	Size code	Specifications Ripple ✻1 current (mArm.s.)	ESR ✻2 (mΩ max.)	tan δ ✻3	LC ✻4 (µA)	Standard Part number	Min. Packaging Q'ty (pcs)
TPH	2.5	105	2.5	105	100	3.2	1.6	0.9	A09	510	150	0.10	25.0	ETPH100MHA	3000
		85	2.5	85	220	3.2	1.6	1.4	A14	740	70	0.10	110.0	ETPH220MABC	2500
	4	105	4.0	105	68	3.2	1.6	0.9	A09	510	150	0.10	27.2	4TPH68MHA	3000
		85	4.0	85	150	3.2	1.6	1.4	A14	740	70	0.10	120.0	4TPH150MABC	2500
	6.3	105	6.3	105	47	3.2	1.6	0.9	A09	510	150	0.10	29.6	6TPH47MHA	3000
		85	6.3	85	100	3.2	1.6	0.9		670	100	0.10	63.0	6TPH100MAEA	3000
		85	6.3	85	100	3.2	1.6	1.4	A14	740	70	0.10	126.0	6TPH100MABC	2500
	10	85	10.0	85	33	3.2	1.6	0.9	A09	510	150	0.10	33.0	ATPH33MAHA	3000

✻1 Ripple current (100 kHz/ +45 °C), ✻2 ESR (100 kHz/+20 °C) ✻3 tan δ (120 Hz/+20 °C) ✻4 After 5 minutes

◆ Please refer to each page in this catarog for “Reflow conditions” and “Taping specifications”.

Surface Mount Type

Series : **TPG**

POSCAP

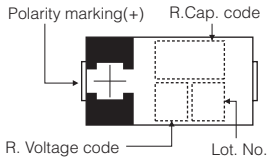
Features

- Small size, Low profile (L3.5 × W 2.8 × H 1.1 mm)
- Large capacitance (220 µF max.)
- RoHS compliance, Halogen free

Specifications

Size code	B1G	B15G
Category temperature range	–55 °C to +105 °C	
Rated voltage range	2.5 V.DC to 12.5 V.DC	2.5 V.DC to 6.3 V.DC
Category voltage range	2.0 V.DC to 10.0 V.DC	2.0 V.DC to 5.0 V.DC
Rated capacitance range	33 µF to 220 µF	150 µF to 220 µF
Capacitance tolerance	±20 % (120 Hz / + 20 °C)	
Leakage current	Please see the attached characteristics list	
Dissipation factor (tan δ)	Please see the attached characteristics list	
Surge voltage (V.DC)	Rated voltage × 1.15	
Endurance	+85 °C, 1000 h rated voltage applied	
	Capacitance change	Within ±20 % of the initial value
	tan δ	≦ 1.5 times of the initial limit
	DC leakage current	Within the initial limit
Damp heat (Steady State)	+60 °C, 90 % to 95 %, 500 h, No-applied voltage	
	Capacitance change	Within +40 %, –20 % of the initial value
	tan δ	≦ 1.5 times of the initial limit
	DC leakage current	≦ 3 times of the initial limit

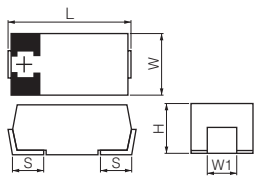
Marking



R. Voltage (V.DC)	2.5	4.0	6.3	8.0	10.0	12.5
Code	e	g	j	k	A	B

R. Cap. (µF)	33	47	100	150	220
Code	N7	S7	A8	E8	J8

Dimensions (not to scale)



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

✻ Externals of figure are the reference.

Characteristics list

Series	Rated voltage (V.DC)	Rated temp. (°C)	Category voltage (V.DC)	Category temp. (°C)	Rated capacitance (µF)	Case size (mm) L	W	H	Size code	Specifications Ripple ✻1 current (mArr.m.s.)	ESR ✻2 (mΩ max.)	tan δ ✻3	LC ✻4 (µA)	Standard Part number	Min. Packaging Q'ty (pcs)
TPG	2.5	85	2.0	105	220	3.5	2.8	1.1	B1G	1000	70	0.10	55.0	2R5TPG220M	2500
		85	2.0	105		3.5	2.8	1.4	B15G	1400	30/300 kHz	0.10	110.0	2R5TPG220MUG	2500
	4	85	3.2	105	220	3.5	2.8	1.4		1000	70	0.10	88.0	4TPG220M	2500
	6.3	85	5.0	105	100	3.5	2.8	1.1	B1G	1000	70	0.10	63.0	6TPG100M	2500
		85	5.0	105		3.5	2.8	1.1		1100	55	0.10	63.0	6TPG100MG	2500
		85	5.0	105		3.5	2.8	1.1		1200	35/300 kHz	0.10	126.0	6TPG100MZGD	2500
		85	5.0	105	150	3.5	2.8	1.4	B15G	1000	70	0.10	94.5	6TPG150M	2500
		85	5.0	105		3.5	2.8	1.4		1200	35/300 kHz	0.10	189.0	6TPG150MZG	2500
	8	85	6.3	105	47	3.5	2.8	1.1	B1G	1000	70	0.10	37.6	8TPG47M	2500
	10	85	8.0	105	47	3.5	2.8	1.1		1000	70	0.10	47.0	10TPG47M	2500
	12.5	85	10.0	105	33	3.5	2.8	1.1		1000	70	0.10	41.3	12TPG33M	2500

✻1 Ripple current (100 kHz/ +45 °C), ✻2 ESR (100 kHz/+20 °C) ✻3 tan δ (120 Hz/+20 °C) ✻4 After 5 minutes

◆ Please refer to each page in this catarog for “Reflow conditions” and “Taping specifications”.

Surface Mount Type

Series : **TPSF**

POSCAP

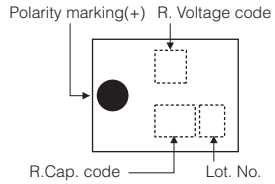
Features

- Super low ESR (6 mΩ max.)
- Super low ESL (0.7 nH)
- Face down terminal type
- RoHS compliance, Halogen free

Specifications

Size code	B2S	
Category temperature range	–55 °C to +105 °C	
Rated voltage range	2.0 V.DC to 2.5 V.DC	
Category voltage range	2.0 V.DC to 2.5 V.DC	
Rated capacitance range	270 µF	
Capacitance tolerance	±20 % (120 Hz / + 20 °C)	
Leakage current	Please see the attached characteristics list	
Dissipation factor (tan δ)	Please see the attached characteristics list	
Surge voltage (V.DC)	Rated voltage × 1.15	
Endurance	+105 °C, 1000 h rated voltage applied	
	Capacitance change	Within ±20 % of the initial value
	tan δ	≦ 1.5 times of the initial limit
	DC leakage current	Within the initial limit
Damp heat (Steady State)	+60 °C, 90 % to 95 %, 500 h, No-applied voltage	
	Capacitance change	Within +40 %, –20 % of the initial value
	tan δ	≦ 1.5 times of the initial limit
	DC leakage current	≦ 3 times of the initial limit

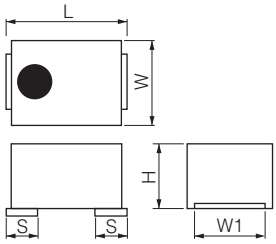
Marking



R. Voltage (V.DC)	2.0	2.5
Code	d	e

R. Cap. (µF)	270
Code	L8

Dimensions (not to scale)



Unit : mm

Size code	L±0.2	W±0.2	H±0.1	S±0.3	W1±0.1
B2S	3.5	2.8	1.9	0.8	2.2

✻ Externals of figure are the reference.

Characteristics list

Series	Rated voltage (V.DC)	Rated temp. (°C)	Category voltage (V.DC)	Category temp. (°C)	Rated capacitance (µF)	Case size (mm) L	W	H	Size code	Specifications Ripple *1 current (mArm.s.)	ESR *2 (mΩ max.)	tan δ *3	LC *4 (µA)	Standard Part number	Min. Packaging Q'ty (pcs)
TPSF	2	105	2.0	105	270	3.5	2.8	1.9	B2S	3200	6/500 kHz	0.08	108	2TPSF270M6E	2000
		105	2.0	105		3.5	2.8	1.9		2400	9/300 kHz	0.08	108	2TPSF270M9G	2000
	2.5	105	2.5	105	270	3.5	2.8	1.9		3200	6/500 kHz	0.08	135	ETPSF270M6E	2000

✻1 Ripple current (100 kHz/ +45 °C), ✻2 ESR (100 kHz/+20 °C) ✻3 tan δ (120 Hz/+20 °C) ✻4 After 5 minutes

◆ Please refer to each page in this catarog for “Reflow conditions” and “Taping specifications”.

Surface Mount Type

POSCAP

Series : **TPE**
Size : **B**

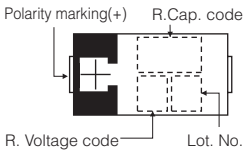
Features

- Small size (L 3.5×W 2.8×H 1.9 mm)
- Low ESR (15 mΩ)
- RoHS compliance, Halogen free

Specifications

Size code	B2	
Category temperature range	–55 °C to +105 °C	
Rated voltage range	2.0 V.DC to 10 V.DC	
Category voltage range	1.8 V.DC to 8.0 V.DC	
Rated capacitance range	47 µF to 470 µF	
Capacitance tolerance	±20 % (120 Hz / + 20 °C)	
Leakage current	Please see the attached characteristics list	
Dissipation factor (tan δ)	Please see the attached characteristics list	
Surge voltage (V.DC)	Rated voltage × 1.15	
Endurance	+105 °C, 1000 h rated voltage applied ✻ Rated temp, +85 °C Products : +85 °C, 1000 h, rated voltage applied	
	Capacitance change	Within ±20 % of the initial value
	tan δ	≦ 1.5 times of the initial limit
	DC leakage current	Within the initial limit
Damp heat (Steady State)	+60 °C, 90 % to 95 %, 500 h, No-applied voltage	
	Capacitance change	Within +50 %, –20 % of the initial value (2R5TPE220MAZB (MAPB, MAFB), 2R5TPE330MAZB, 2TPE330MAFB (MADGB), 2TPE470MAJGB (MAFB), 2TPE330MFB)
		Within +40 %, –20 % of the initial value (Except for above model)
	tan δ	≦ 1.5 times of the initial limit
	DC leakage current	≦ 3 times of the initial limit

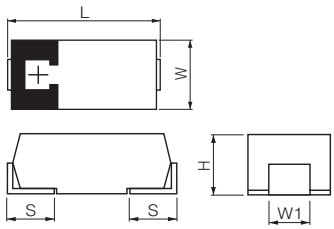
Marking



R. Voltage (V.DC)	2.0	2.5	4.0	6.3	8.0	10.0
Code	d	e	g	j	k	A

R. Cap. (µF)	47	100	120	150	220	330	470
Code	S7	A8	C8	E8	J8	N8	S8

Dimensions (not to scale)



Unit : mm

Size code	L±0.2	W±0.2	H±0.1	S±0.2	W1±0.1
B2	3.5	2.8	1.9	0.8	2.2

✻ Externals of figure are the reference.

Characteristics list

Series	Rated voltage (V.DC)	Rated temp. (°C)	Category voltage (V.DC)	Category temp. (°C)	Rated capacitance (µF)	Case size (mm) L	W	H	Size code	Specifications Ripple *1 current (mArm.s.)	ESR *2 (mΩ max.)	tan δ *3	LC *4 (µA)	Standard Part number	Min. Packaging Q'ty (pcs)
TPE	2	105	2.0	105	330	3.5	2.8	1.9	B2	2000	15	0.08	132.0	2TPE330MFB	2000
		85	1.8	105		3.5	2.8	1.9		2000	15	0.08	132.0	2TPE330MAFB	2000
		85	1.8	105		3.5	2.8	1.9		2000	13/300 kHz	0.10	132.0	2TPE330MADGB	2000
		85	1.8	105	470	3.5	2.8	1.9		2300	15	0.10	188.0	2TPE470MAFB	2000
		85	1.8	105		3.5	2.8	1.9		2300	11/300 kHz	0.08	188.0	2TPE470MAJGB	2000
	2.5	85	2.0	105	220	3.5	2.8	1.9		2000	15	0.08	110.0	2R5TPE220MAFB	2000
		105	2.5	105		3.5	2.8	1.9		1800	15/300 kHz	0.08	110.0	2R5TPE220MFGB	2000
		105	2.5	105		3.5	2.8	1.9		1700	21	0.08	55.0	2R5TPE220MLB	2000
		85	2.0	105		3.5	2.8	1.9		1600	25	0.08	55.0	2R5TPE220MAPB	2000
		105	2.5	105		3.5	2.8	1.9		1400	35	0.08	55.0	2R5TPE220MZB	2000
		85	2.0	105		3.5	2.8	1.9		1400	35	0.08	55.0	2R5TPE220MAZB	2000
		85	2.0	105	330	3.5	2.8	1.9		1400	35	0.08	82.5	2R5TPE330MAZB	2000
	4	105	4.0	105	100	3.5	2.8	1.9		1400	35	0.08	40.0	4TPE100MZB	2000
		85	3.2	105	150	3.5	2.8	1.9		1400	35	0.08	60.0	4TPE150MAZB	2000
		85	3.2	105	220	3.5	2.8	1.9		1400	35	0.08	88.0	4TPE220MAZB	2000
	6.3	105	6.3	105	100	3.5	2.8	1.9		1600	25	0.08	63.0	6TPE100MPB	2000
		85	5.0	105		3.5	2.8	1.9		1400	35	0.08	63.0	6TPE100MAZB	2000
		85	5.0	105	120	3.5	2.8	1.9		1400	35	0.08	75.6	6TPE120MAZB	2000
		85	5.0	105	150	3.5	2.8	1.9		1600	25	0.08	94.5	6TPE150MAPB	2000
		85	5.0	105		3.5	2.8	1.9		1400	35	0.08	94.5	6TPE150MAZB	2000
		85	5.0	105	220	3.5	2.8	1.9		1400	35	0.10	138.6	6TPE220MAZB	2000
	8	85	6.3	105	100	3.5	2.8	1.9		1400	35	0.08	80.0	8TPE100MAZB	2000
	10	85	8.0	105	47	3.5	2.8	1.9		1400	35	0.08	47.0	10TPE47MAZB	2000

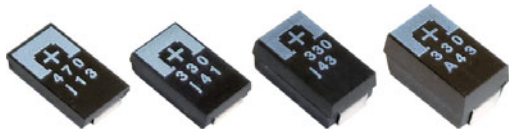
✻1 Ripple current (100 kHz/ +45 °C), ✻2 ESR (100 kHz/+20 °C) ✻3 tan δ (120 Hz/+20 °C) ✻4 After 5 minutes

◆ Please refer to each page in this catarog for “Reflow conditions” and “Taping specifications”.

Surface Mount Type

POSCAP

Series : **TPE**
Size : **D**



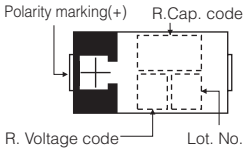
Features

- Low profile (Height 1.5 mm max.)
- Low ESR (7 mΩ)
- Large capacitance (1500 µF max.)
- RoHS compliance, Halogen free

Specifications

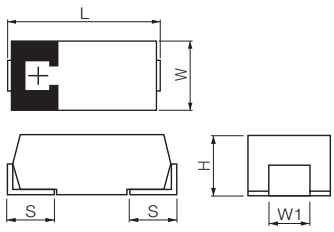
Size code	D15E	D2E	D3L	D4
Category temperature range	–55 °C to +105 °C			
Rated voltage range	6.3 V.DC	2.5 V.DC to 10 V.DC		
Category voltage range	5.0 V.DC	2.5 V.DC to 10 V.DC		
Rated capacitance range	470 µF	68 µF to 470 µF	220 µF to 680 µF	330 µF to 1500 µF
Capacitance tolerance	±20 % (120 Hz / + 20 °C)			
Leakage current	Please see the attached characteristics list			
Dissipation factor (tan δ)	Please see the attached characteristics list			
Surge voltage (V.DC)	Rated voltage × 1.15			
Endurance	+105 °C, 2000 h rated voltage applied ✻ Rated temp, +85 °C Products : +85 °C, 1000 h, rated voltage applied 6TPE330MAP, 6TPE470MAZU : +85 °C, 2000 h,			
	Capacitance change	Within ±20 % of the initial value		
	tan δ	≦ 1.5 times of the initial limit		
	DC leakage current	Within the initial limit		
Damp heat (Steady State)	+60 °C, 90 % to 95 %, 500 h, No-applied voltage			
	Capacitance change	Within +50 %, –20 % of the initial value (2R5TPE220M (I, F, 9), 2R5TPE330M (I, F, C, 9, 7), 2R5TPE470M (I, F, C, 9, 7), 2R5TPE1000MF, 2R5TPE1500M (F, C))		
		Within +40 %, –20 % of the initial value (Except for above model)		
	tan δ	≦ 1.5 times of the initial limit		
	DC leakage current	≦ 3 times of the initial limit		

Marking



R. Voltage (V.DC)	2.5	4.0	6.3	10.0
Code	e	g	j	A

Dimensions (not to scale)



Unit : mm

Size code	L±0.3	W±0.2	H±0.2*1	S±0.2	W1±0.1
D15E	7.3	4.3	1.4	1.1	2.4
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

✻ Externals of figure are the reference.
✻ 1 ±0.1 :D15E, D2E

Characteristics list

Series	Rated voltage (V.DC)	Rated temp. (°C)	Category voltage (V.DC)	Category temp. (°C)	Rated capacitance (µF)	Case size (mm) L	W	H	Size code	Specifications Ripple *1 current (mArm.s.)	ESR *2 (mΩ max.)	tan δ *3	LC *4 (µA)	Standard Part number	Min. Packaging Q'ty (pcs)
TPE	2.5	105	2.5	105	220	7.3	4.3	1.8	D2E	3900	9	0.10	55.0	2R5TPE220M9	3000
		105	2.5	105		7.3	4.3	1.8		3100	15	0.10	55.0	2R5TPE220MF	3000
		105	2.5	105		7.3	4.3	1.8		2800	18	0.10	55.0	2R5TPE220MI	3000
		105	2.5	105		7.3	4.3	1.8		2400	25	0.10	55.0	2R5TPE220M	3000
		105	2.5	105	330	7.3	4.3	1.8		4400	7	0.10	82.5	2R5TPE330M7	3000
		105	2.5	105		7.3	4.3	1.8		3900	9	0.10	82.5	2R5TPE330M9	3000
		105	2.5	105		7.3	4.3	1.8		3500	12	0.10	82.5	2R5TPE330MC	3000
		105	2.5	105		7.3	4.3	1.8		3100	15	0.10	82.5	2R5TPE330MF	3000
		105	2.5	105		7.3	4.3	1.8		2800	18	0.10	82.5	2R5TPE330MI	3000
		105	2.5	105		7.3	4.3	1.8		2400	25	0.10	82.5	2R5TPE330M	3000
		105	2.5	105	470	7.3	4.3	1.8		4400	7	0.10	117.5	2R5TPE470M7	3000
		105	2.5	105		7.3	4.3	1.8		3900	9	0.10	117.5	2R5TPE470M9	3000
		105	2.5	105		7.3	4.3	1.8		3500	12	0.10	117.5	2R5TPE470MC	3000
		105	2.5	105		7.3	4.3	1.8		3100	15	0.10	117.5	2R5TPE470MF	3000
		105	2.5	105		7.3	4.3	1.8		2800	18	0.10	117.5	2R5TPE470MI	3000
		105	2.5	105	680	7.3	4.3	2.8	D3L	3500	12	0.10	170.0	2R5TPE680MCL	2500
		105	2.5	105		7.3	4.3	2.8		3100	15	0.10	170.0	2R5TPE680MFL	2500
		105	2.5	105	1000	7.3	4.3	3.8	D4	3900	15	0.15	250.0	2R5TPE1000MF	2000
		105	2.5	105	1500	7.3	4.3	3.8		4400	12	0.15	375.0	2R5TPE1500MC	2000
		105	2.5	105		7.3	4.3	3.8		3900	15	0.15	375.0	2R5TPE1500MF	2000
	4	105	4.0	105	150	7.3	4.3	1.8	D2E	2800	18	0.10	60.0	4TPE150MI	3000
		105	4.0	105	220	7.3	4.3	1.8		3100	15	0.10	88.0	4TPE220MF	3000
		105	4.0	105		7.3	4.3	1.8		2800	18	0.10	88.0	4TPE220MI	3000
		105	4.0	105		7.3	4.3	1.8		2400	25	0.10	88.0	4TPE220M	3000
		105	4.0	105	330	7.3	4.3	1.8		2800	18	0.10	132.0	4TPE330MI	3000
		105	4.0	105		7.3	4.3	1.8		2400	25	0.10	132.0	4TPE330M	3000
		105	4.0	105	470	7.3	4.3	2.8	D3L	3500	12	0.10	188.0	4TPE470MCL	2500
		105	4.0	105		7.3	4.3	2.8		3100	15	0.10	188.0	4TPE470MFL	2500
		105	4.0	105		7.3	4.3	2.8		2800	18	0.10	188.0	4TPE470MIL	2500
		105	4.0	105		7.3	4.3	2.8		2400	25	0.10	188.0	4TPE470ML	2500
	6.3	105	6.3	105	100	7.3	4.3	1.8	D2E	2800	18	0.10	63.0	6TPE100MI	3000
		105	6.3	105		7.3	4.3	1.8		2400	25	0.10	63.0	6TPE100M	3000
		105	6.3	105	150	7.3	4.3	1.8		3100	15	0.10	94.5	6TPE150MF	3000
		105	6.3	105		7.3	4.3	1.8		2800	18	0.10	94.5	6TPE150MI	3000
		105	6.3	105		7.3	4.3	1.8		2400	25	0.10	94.5	6TPE150M	3000
		105	6.3	105	220	7.3	4.3	1.8		2800	18	0.10	138.6	6TPE220MI	3000
		105	6.3	105		7.3	4.3	1.8		2400	25	0.10	138.6	6TPE220M	3000
		85	5.0	105		7.3	4.3	1.8		2400	25	0.10	138.6	6TPE220MAP	3000
		85	5.0	105	330	7.3	4.3	1.8		2400	25	0.10	207.9	6TPE330MAP	3000
		85	5.0	105		7.3	4.3	2.8	D3L	2400	25	0.10	207.9	6TPE330MAL	2500
		85	5.0	105		7.3	4.3	2.8		3900	9/500 Hz	0.10	207.9	6TPE330MA9EL	2500
		105	6.3	105		7.3	4.3	2.8		3100	15	0.10	207.9	6TPE330MFL	2500
		105	6.3	105		7.3	4.3	2.8		2800	18	0.10	207.9	6TPE330MIL	2500
		105	6.3	105		7.3	4.3	2.8		2400	25	0.10	207.9	6TPE330ML	2500
		85	5.0	105		7.3	4.3	3.8	D4	4400	10	0.10	207.9	6TPE330MAA	2000
		85	5.0	105	470	7.3	4.3	1.4	D15E	1700	35	0.10	296.1	6TPE470MAZU	4000
		105	6.3	105		7.3	4.3	3.8	D4	3500	18	0.15	296.1	6TPE470MI	2000
		105	6.3	105		7.3	4.3	3.8		3000	25	0.15	296.1	6TPE470M	2000
		105	6.3	105	680	7.3	4.3	3.8		3500	18	0.15	428.4	6TPE680MI	2000
		105	6.3	105		7.3	4.3	3.8		3000	25	0.15	428.4	6TPE680M	2000
	10	105	10.0	105	68	7.3	4.3	1.8	D2E	2400	25	0.10	68.0	10TPE68M	3000
		105	10.0	105	220	7.3	4.3	2.8	D3L	2800	18	0.10	220.0	10TPE220MIL	2500
		105	10.0	105		7.3	4.3	2.8		2400	25	0.10	220.0	10TPE220ML	2500
		105	10.0	105	330	7.3	4.3	3.8	D4	3000	25	0.10	330.0	10TPE330M	2000

✻1 Ripple current (100 kHz/ +45 °C), ✻2 ESR (100 kHz/+20 °C) ✻3 tan δ (120 Hz/+20 °C) ✻4 After 5 minutes

◆ Please refer to each page in this catarog for “Reflow conditions” and “Taping specifications”.

Surface Mount Type

Series : **TPF**

POSCAP

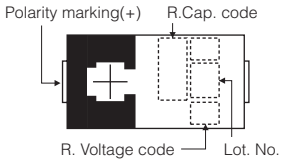
Features

- Super low ESR (5 mΩ max.)
- Large capacitance (1000 µF max.)
- RoHS compliance, Halogen free

Specifications

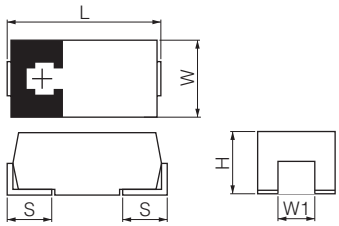
Size code	D2E	D3L	D4
Category temperature range	–55 °C to +105 °C		
Rated voltage range	2.0 V.DC	2.5 V.DC to 10 V.DC	2.5 V.DC to 6.3 V.DC
Category voltage range	2.0 V.DC	2.5 V.DC to 10 V.DC	2.5 V.DC to 6.3 V.DC
Rated capacitance range	220 µF to 330 µF	150 µF to 680 µF	470 µF to 1000 µF
Capacitance tolerance	±20 % (120 Hz / + 20 °C)		
Leakage current	Please see the attached characteristics list		
Dissipation factor (tan δ)	Please see the attached characteristics list		
Surge voltage (V.DC)	Rated voltage × 1.15		
Endurance	+105 °C, 2000 h rated voltage applied		
	Capacitance change	Within ±20 % of the initial value	
	tan δ	≦ 1.5 times of the initial limit	
	DC leakage current	Within the initial limit	
Damp heat (Steady State)	+60 °C, 90 % to 95 %, 500 h, No-applied voltage		
	Capacitance change	Within +50 %, –20 % of the initial value (2TPF220M6, 2TPF330M6, ETPF1000M6H (5H))	
		Within +40 %, –20 % of the initial value (Except for above model)	
	tan δ	≦ 1.5 times of the initial limit	
	DC leakage current	≦ 3 times of the initial limit	

Marking



R. Voltage (V.DC)	2.0	2.5	4.0	6.3	10.0
Code	d	e	g	j	A

Dimensions (not to scale)



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

✻ Externals of figure are the reference.
✻ 1 ±0.1 :D2E

Characteristics list

Series	Rated voltage (V.DC)	Rated temp. (°C)	Category voltage (V.DC)	Category temp. (°C)	Rated capacitance (µF)	Case size (mm) L	W	H	Size code	Specifications Ripple *1 current (mArm.s.)	ESR *2 (mΩ max.)	tan δ *3	LC *4 (µA)	Standard Part number	Min. Packaging Q'ty (pcs)
TPF	2	105	2.0	105	220	7.3	4.3	1.8	D2E	4700	6	0.10	88.0	2TPF220M6	3000
		105	2.0	105	330	7.3	4.3	1.8		4700	6	0.10	132.0	2TPF330M6	3000
	2.5	105	2.5	105	330	7.3	4.3	2.8	D3L	4400	7	0.10	82.5	2R5TPF330M7L	2500
		105	2.5	105	470	7.3	4.3	2.8		4400	6	0.10	117.5	2R5TPF470M6L	2500
		105	2.5	105		7.3	4.3	2.8		4400	7	0.10	117.5	2R5TPF470M7L	2500
		105	2.5	105		7.3	4.3	2.8		4400	10	0.10	117.5	2R5TPF470ML	2500
		105	2.5	105		7.3	4.3	3.8	D4	6100	5	0.10	117.5	ETPF470M5H	2000
		105	2.5	105	680	7.3	4.3	2.8	D3L	4400	6	0.10	170.0	2R5TPF680M6L	2500
		105	2.5	105		7.3	4.3	2.8		4400	7	0.10	170.0	2R5TPF680M7L	2500
		105	2.5	105		7.3	4.3	2.8		4400	10	0.10	170.0	2R5TPF680ML	2500
		105	2.5	105		7.3	4.3	3.8	D4	6100	5	0.10	170.0	ETPF680M5H	2000
		105	2.5	105	1000	7.3	4.3	3.8		6100	5	0.10	250.0	ETPF1000M5H	2000
		105	2.5	105		7.3	4.3	3.8		5600	6	0.10	250.0	ETPF1000M6H	2000
	4	105	4.0	105	330	7.3	4.3	2.8	D3L	4000	12	0.10	132.0	4TPF330ML	2500
		105	4.0	105	470	7.3	4.3	2.8		4400	10	0.10	188.0	4TPF470ML	2500
		105	4.0	105	680	7.3	4.3	3.8	D4	4400	10	0.10	272.0	4TPF680MAH	2000
	6.3	105	6.3	105	220	7.3	4.3	2.8	D3L	6100	5	0.10	138.6	6TPF220M5L	2500
		105	6.3	105		7.3	4.3	2.8		4600	9	0.10	138.6	6TPF220M9L	2500
		105	6.3	105		7.3	4.3	2.8		4000	12	0.10	138.6	6TPF220ML	2500
		105	6.3	105	330	7.3	4.3	2.8		3900	9	0.10	207.9	6TPF330M9L	2500
		105	6.3	105	470	7.3	4.3	3.8	D4	4400	10	0.10	296.1	6TPF470MAH	2000
	10	105	10.0	105	150	7.3	4.3	2.8	D3L	3600	15	0.10	150.0	10TPF150ML	2500

✻1 Ripple current (100 kHz/ +45 °C), ✻2 ESR (100 kHz/+20 °C) ✻3 tan δ (120 Hz/+20 °C) ✻4 After 5 minutes

◆ Please refer to each page in this catarog for “Reflow conditions” and “Taping specifications”.

Surface Mount Type

POSCAP

Series : **TA**

Features

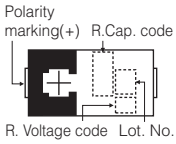
- Guaranteed at 85 °C 85 %RH
- RoHS compliance, Halogen free

Specifications

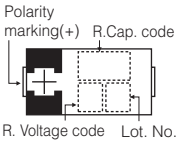
Size code	B2	D2E	D3L
Category temperature range	–55 °C to +105 °C		
Rated voltage range	4 V.DC to 10 V.DC	2.5 V.DC to 10 V.DC	
Category voltage range	4 V.DC to 10 V.DC	2.5 V.DC to 10 V.DC	
Rated capacitance range	47µF to 100 µF	68 µF to 470 µF	150 µF to 680 µF
Capacitance tolerance	±20 % (120 Hz / + 20 °C)		
Leakage current	Please see the attached characteristics list		
Dissipation factor (tan δ)	Please see the attached characteristics list		
Surge voltage (V.DC)	Rated voltage × 1.15		
Endurance	+105 °C, 2000 h, (B2 size : 1000 h) rated voltage applied		
	Capacitance change	Within ±20 % of the initial value	
	tan δ	≦ 1.5 times of the initial limit	
	DC leakage current	Within the initial limit	
Damp heat (Steady State)	+85 °C, 85 % to 90 %, 500 h, rated voltage applied		
	Capacitance change	Within +50 %, –20 % of the initial value (2R5TAE470M(F), 2R5TAE330M(F, I), 2R5TAE220M(F, 9))	
		Within +40 %, –20 % of the initial value (Except for above model)	
	tan δ	≦ 1.5 times of the initial limit	
	DC leakage current	Within the initial limit	

Marking

D2E, D3L Size



B2 Size

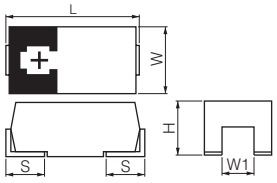


R. Voltage (V.DC)	2.5	4.0	6.3	10.0
Code	e	g	j	A

B2 Size

R. Cap. (µF)	47	68	100
Code	S7	W7	A8

Dimensions (not to scale)



Unit : mm

Size Code	L±0.3*1	W±0.2	H±0.2*2	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

✻ Externals of figure are the reference.
✻ 1 ±0.2 : B2
✻ 2 ±0.1 : B2, D2E

Characteristics list

Series	Rated voltage (V.DC)	Rated temp. (°C)	Category voltage (V.DC)	Category temp. (°C)	Rated capacitance (µF)	Case size (mm) L	W	H	Size code	Specifications Ripple*1 current (mArm.s.)	ESR*2 (mΩ max.)	tan δ*3	LC*4 (µA)	Standard Part number	Min. Packaging Q'ty (pcs)
TA	2.5	105	2.5	105	220	7.3	4.3	1.8	D2E	3900	9	0.10	110.0	2R5TAE220M9	3000
		105	2.5	105		7.3	4.3	1.8		3100	15	0.10	55.0	2R5TAE220MF	3000
		105	2.5	105		7.3	4.3	1.8		2400	25	0.10	55.0	2R5TAE220M	3000
		105	2.5	105	330	7.3	4.3	1.8		3100	15	0.10	82.5	2R5TAE330MF	3000
		105	2.5	105		7.3	4.3	1.8		2800	18	0.10	82.5	2R5TAE330MI	3000
		105	2.5	105		7.3	4.3	1.8		2400	25	0.10	82.5	2R5TAE330M	3000
		105	2.5	105	470	7.3	4.3	1.8		3100	15	0.10	117.5	2R5TAE470MF	3000
		105	2.5	105		7.3	4.3	1.8		2400	25	0.10	117.5	2R5TAE470M	3000
		105	2.5	105	680	7.3	4.3	2.8	D3L	3100	15	0.10	170.0	2R5TAE680MFL	2500
		105	2.5	105		7.3	4.3	2.8		2400	25	0.10	170.0	2R5TAE680ML	2500
	4	105	4.0	105	100	3.8	2.8	1.9	B2	1100	70	0.08	40.0	4TAB100M	2000
		105	4.0	105	220	7.3	4.3	1.8	D2E	2800	18	0.10	88.0	4TAE220MI	3000
		105	4.0	105		7.3	4.3	1.8		2400	25	0.10	88.0	4TAE220M	3000
		105	4.0	105	470	7.3	4.3	2.8	D3L	2800	18	0.10	188.0	4TAE470MIL	2500
		105	4.0	105		7.3	4.3	2.8		2400	25	0.10	188.0	4TAE470ML	2500
	6.3	105	6.3	105	47	3.5	2.8	1.9	B2	1100	70	0.08	29.6	6TAB47M	2000
		105	6.3	105	68	3.5	2.8	1.9		1100	70	0.08	42.8	6TAB68M	2000
		105	6.3	105	150	7.3	4.3	1.8	D2E	2400	25	0.10	94.5	6TAE150M	3000
		105	6.3	105	220	7.3	4.3	1.8		2800	18	0.10	138.6	6TAE220MI	3000
		105	6.3	105		7.3	4.3	1.8		2400	25	0.10	138.6	6TAE220M	3000
		105	6.3	105	330	7.3	4.3	2.8	D3L	2400	25	0.10	207.9	6TAE330ML	2500
	10	105	10.0	105	47	3.5	2.8	1.9	B2	1100	70	0.08	47.0	10TAB47M	2000
		105	10.0	105	68	7.3	4.3	1.8	D2E	2400	25	0.10	68.0	10TAE68M	3000
		105	10.0	105	150	7.3	4.3	2.8	D3L	2400	25	0.10	150.0	10TAE150ML	2500
		105	10.0	105	220	7.3	4.3	2.8		2400	25	0.10	220.0	10TAE220ML	2500

✻1 Ripple current (100 kHz/ +45 °C), ✻2 ESR (100 kHz/+20 °C) ✻3 tan δ (120 Hz/+20 °C) ✻4 After 5 minutes

◆ Please refer to each page in this catarog for “Reflow conditions” and “Taping specifications”.

Surface Mount Type

Series : **TV**

POSCAP

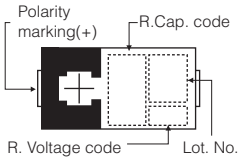
Features

- Guaranteed at 85 °C 85 %RH
- Guaranteed at 125 °C
- RoHS compliance, Halogen free

Specifications

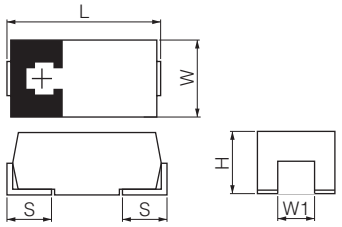
Size code	D2E	D3L
Category temperature range	–55 °C to +125 °C	
Rated voltage range	6.3 V.DC to 10 V.DC	10 V.DC
Category voltage range	4.0 V.DC to 6.3 V.DC	6.3 V.DC
Rated capacitance range	68 µF to 150 µF	150 µF
Capacitance tolerance	±20 % (120 Hz / + 20 °C)	
Leakage current	Please see the attached characteristics list	
Dissipation factor (tan δ)	Please see the attached characteristics list	
Surge voltage (V.DC)	Rated voltage × 1.15	
Endurance	+125 °C, 1000 h, category voltage applied (+105 °C 2000 h, rated voltage applied)	
	temp.	125 °C / 105 °C
	Capacitance change	Within ±20 % of the initial value / Within ±20 % of the initial value
	tan δ	≦ 2 times of the initial limit / ≦ 1.5 times of the initial limit
Damp heat (Steady State)	DC leakage current	≦ 2 times of the initial limit / Within the initial limit
	+85 °C, 85 % to 90 %, 500 h, rated voltage applied	
	Capacitance change	Within +40 %, –20 % of the initial value
	tan δ	≦ 1.5 times of the initial limit
	DC leakage current	Within the initial limit

Marking



R. Voltage (V.DC)	6.3	10.0
Code	j	A

Dimensions (not to scale)



Unit : mm

Size code	L±0.3	W±0.2*1	H±0.2	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

✻ Externals of figure are the reference. ✻1 ±0.1 : D2E

Characteristics list

Series	Rated voltage (V.DC)	Rated temp. (°C)	Category voltage (V.DC)	Category temp. (°C)	Rated capacitance (µF)	Case size (mm) L	W	H	Size code	Specifications Ripple *1 current (mArm.s.)	ESR *2 (mΩ max.)	tan δ *3	LC *4 (µA)	Standard Part number	Min. Packaging Q'ty (pcs)
TV	6.3	105	4.0	125	150	7.3	4.3	1.8	D2E	2400	25	0.10	94.5	6TVE150M	3000
	10	105	6.3	125	68	7.3	4.3	1.8	D2E	2400	25	0.10	68.0	10TVE68M	3000
		105	6.3	125	150	7.3	4.3	2.8	D3L	2400	25	0.10	150.0	10TVE150ML	2500

✻1 Ripple current (100 kHz/ +45 °C), ✻2 ESR (100 kHz/+20 °C) ✻3 tan δ (120 Hz/+20 °C) ✻4 After 5 minutes

◆ Please refer to each page in this catarog for “Reflow conditions” and “Taping specifications”.

Surface Mount Type

POSCAP

Series : **TQC**
Size : **B**

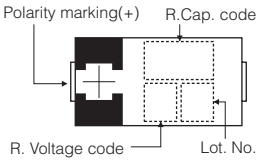
Features

- High voltage (35 V.DC max.)
- RoHS compliance, Halogen free

Specifications

Size code	B2	
Category temperature range	–55 °C to +105 °C	
Rated voltage range	16 V.DC to 35 V.DC	
Category voltage range	16 V.DC to 35 V.DC	
Rated capacitance range	3.9 µF to 33 µF	
Capacitance tolerance	±20 % (120 Hz / + 20 °C)	
Leakage current	Please see the attached characteristics list	
Dissipation factor (tan δ)	Please see the attached characteristics list	
Surge voltage (V.DC)	Rated voltage × 1.15	
Endurance	+105 °C, 2000 h (16TQC33MYFB : 1000 h), rated voltage applied	
	Capacitance change	Within ±20 % of the initial value
	tan δ	≦ 1.5 times of the initial limit
	DC leakage current	Within the initial limit
Damp heat (Steady State)	+60 °C, 90 % to 95 %, 500 h, No-applied voltage	
	Capacitance change	Within +40 %, –20 % of the initial value
	tan δ	≦ 1.5 times of the initial limit
	DC leakage current	≦ 3 times of the initial limit

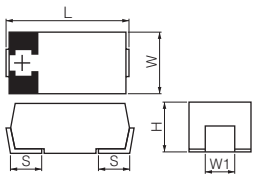
Marking



R. Voltage (V.DC)	16	20	25	35
Code	C	D	E	V

R. Cap. (µF)	3.9	5.6	8.2	10	15	22	33
Code	Q6	U6	Y6	A7	E7	J7	N7

Dimensions (not to scale)



Unit : mm

Size code	L±0.2	W±0.2	H±0.1	S±0.2	W1±0.1
B2	3.5	2.8	1.9	0.8	2.2

✻ Externals of figure are the reference.

Characteristics list

Series	Rated voltage (V.DC)	Rated temp. (°C)	Category voltage (V.DC)	Category temp. (°C)	Rated capacitance (µF)	Case size (mm) L	W	H	Size code	Specifications Ripple ✻1 current (mArm.s.)	ESR ✻2 (mΩ max.)	tan δ ✻3	LC ✻4 (µA)	Standard Part number	Min. Packaging Q'ty (pcs)
TQC	16	105	16.0	105	10	3.5	2.8	1.9	B2	800	100	0.10	48.0	16TQC10M	2000
		105	16.0	105	15	3.5	2.8	1.9		1000	90	0.10	72.0	16TQC15M	2000
		105	16.0	105	33	3.5	2.8	1.9		1000	90	0.10	158.4	16TQC33MYFB	2000
	20	105	20.0	105	8.2	3.5	2.8	1.9		800	100	0.10	49.2	20TQC8R2M	2000
		105	20.0	105	22	3.5	2.8	1.9		1100	90	0.10	132.0	20TQC22MYFB	2000
	25	105	25.0	105	5.6	3.5	2.8	1.9		800	100	0.10	42.0	25TQC5R6M	2000
		105	25.0	105	15	3.5	2.8	1.9		900	100	0.10	112.5	25TQC15MYFB	2000
	35	105	35.0	105	3.9	3.5	2.8	1.9		500	400	0.10	40.9	35TQC3R9MYF	2000

✻1 Ripple current (100 kHz/ +105 °C), ✻2 ESR (100 kHz/+20 °C) ✻3 tan δ (120 Hz/+20 °C) ✻4 After 5 minutes

◆ Please refer to each page in this catarog for “Reflow conditions” and “Taping specifications”.

Surface Mount Type

POSCAP

Series : **TQC**

Size : **D**

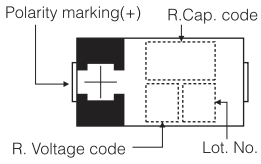
Features

- High voltage (35 V.DC max.)
- RoHS compliance, Halogen free

Specifications

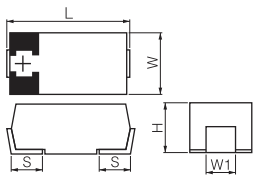
Size code	D12	D15	D2	D3L
Category temperature range	–55 °C to +105 °C			
Rated voltage range	16 V.DC	16 V.DC to 25 V.DC	16 V.DC to 35 V.DC	16 V.DC to 25 V.DC
Category voltage range	16 V.DC	16 V.DC to 25 V.DC	16 V.DC to 35 V.DC	16 V.DC to 25 V.DC
Rated capacitance range	33 µF	22 µF to 47 µF	10 µF to 100 µF	68 µF to 150 µF
Capacitance tolerance	±20 % (120 Hz / + 20 °C)			
Leakage current	Please see the attached characteristics list			
Dissipation factor (tan δ)	Please see the attached characteristics list			
Surge voltage (V.DC)	Rated voltage × 1.15			
Endurance	+105 °C, 2000 h, rated voltage applied			
	Capacitance change	Within ±20 % of the initial value		
	tan δ	≦ 1.5 times of the initial limit		
	DC leakage current	Within the initial limit		
Damp heat (Steady State)	+60 °C, 90 % to 95 %, 500 h, No-applied voltage			
	Capacitance change	Within +40 %, –20 % of the initial value		
	tan δ	≦ 1.5 times of the initial limit		
	DC leakage current	≦ 3 times of the initial limit		

Marking



R. Voltage (V.DC)	16	20	25	35
Code	C	D	1E	V

Dimensions (not to scale)



Unit : mm

Size code	L±0.2 *1	W±0.2	H±0.1 *2	S±0.2	W1±0.1
D12	7.3	4.3	1.15	1.3	2.4
D15	7.3	4.3	1.4	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

✻ Externals of figure are the reference.
✻ 1 ±0.3 : D3L
✻ 2 ±0.05 : D12, ±0.2 : D3L

Characteristics list

Series	Rated voltage (V.DC)	Rated temp. (°C)	Category voltage (V.DC)	Category temp. (°C)	Rated capacitance (µF)	Case size (mm) L	W	H	Size code	Specifications Ripple *1 current (mArm.s.)	ESR *2 (mΩ max.)	tan δ *3	LC *4 (µA)	Standard Part number	Min. Packaging Q'ty (pcs)
TQC	16	105	16.0	105	33	7.3	4.3	1.15	D12	1800	40	0.10	52.8	16TQC33MYFS	4500
		105	16.0	105		7.3	4.3	1.9	D2	1400	70	0.10	52.8	16TQC33MYFD	3000
		105	16.0	105	47	7.3	4.3	1.4	D15	1500	55	0.10	75.2	16TQC47MYFT	3000
		105	16.0	105		7.3	4.3	1.9	D2	1800	40	0.10	75.2	16TQC47MW	3000
		105	16.0	105		7.3	4.3	1.9		1450	55	0.10	75.2	16TQC47MYFD	3000
		105	16.0	105	68	7.3	4.3	1.9		1500	50	0.10	108.8	16TQC68MYF	3000
		105	16.0	105	100	7.3	4.3	1.9		1800	50	0.10	160.0	16TQC100MYF	3000
		105	16.0	105	150	7.3	4.3	2.8	D3L	1800	50	0.10	240.0	16TQC150MYF	2500
	NEW	105	16.0	105	150	7.3	4.3	1.9	D2	1500	70	0.15	240.0	1CTQC15173F1	3000
	20	105	20.0	105	33	7.3	4.3	1.9		1400	60	0.10	66.0	20TQC33MYFD	3000
		105	20.0	105	47	7.3	4.3	1.9		1450	55	0.10	94.0	20TQC47MYF	3000
		105	20.0	105		7.3	4.3	1.4	D15	1500	55	0.10	94.0	20TQC47MYFT	3000
	NEW	105	20.0	105	100	7.3	4.3	1.9	D2	1250	100	0.15	200.0	20TQC100MD2	3000
		105	20.0	105		7.3	4.3	2.8	D3L	1700	55	0.10	200.0	20TQC100MYF	2500
	25	105	25.0	105	15	7.3	4.3	1.9		1500	45	0.10	38.0	25TQC15MV	3000
		105	25.0	105		7.3	4.3	1.9	D2	1000	90	0.10	38.0	25TQC15MYFD	3000
		105	25.0	105	22	7.3	4.3	1.9		1500	45	0.10	55.0	25TQC22MV	3000
		105	25.0	105		7.3	4.3	1.9		1400	60	0.10	55.0	25TQC22MYFD	3000
		105	25.0	105		7.3	4.3	1.4	D15	1400	70	0.10	55.0	25TQC22MYFT	3000
		105	25.0	105	33	7.3	4.3	1.9	D2	1400	60	0.10	82.5	25TQC33MYF	3000
		105	25.0	105	68	7.3	4.3	2.8	D3L	1400	70	0.10	170.0	25TQC68MYF	2500
	35	105	35.0	105	10	7.3	4.3	1.9		1000	120	0.10	35.0	35TQC10M	3000
		105	35.0	105		7.3	4.3	1.9	D2	1000	120	0.10	35.0	35TQC10MYF	3000
		105	35.0	105	15	7.3	4.3	1.9		900	150	0.10	52.5	35TQC15MYF	3000

✻1 Ripple current (100 kHz/ +105 °C), ✻2 ESR (100 kHz/+20 °C) ✻3 tan δ (120 Hz/+20 °C) ✻4 After 5 minutes
◆ Please refer to each page in this catarog for "Reflow conditions" and "Taping specifications".

Surface Mount Type

Series : **TQS**

POSCAP

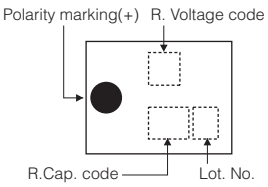
Features

- High voltage (35 V.DC max.)
- RoHS compliance, Halogen free

Specifications

Size code	B1S	
Category temperature range	–55 °C to +105 °C	
Rated voltage range	16 V.DC to 35 V.DC	
Category voltage range	16 V.DC to 35 V.DC	
Rated capacitance range	6.8 µF to 33 µF	
Capacitance tolerance	±20 % (120 Hz / + 20 °C)	
Leakage current	Please see the attached characteristics list	
Dissipation factor (tan δ)	Please see the attached characteristics list	
Surge voltage (V.DC)	Rated voltage × 1.15	
Endurance	+105 °C, 1000 h, rated voltage applied	
	Capacitance change	Within ±20 % of the initial value
	tan δ	≦ 1.5 times of the initial limit
	DC leakage current	Within the initial limit
Damp heat (Steady State)	+60 °C, 90 % to 95 %, 500 h, No-applied voltage	
	Capacitance change	Within +40 %, –20 % of the initial value
	tan δ	≦ 1.5 times of the initial limit
	DC leakage current	≦ 3 times of the initial limit

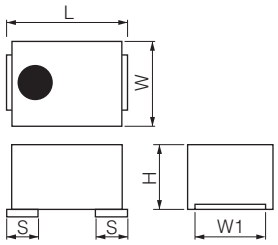
Marking



R. Voltage (V.DC)	16	25	35
Code	C	E	V

R. Cap. (µF)	6.8	10	33
Code	W6	A7	N7

Dimensions (not to scale)



Unit : mm

Size code	L±0.2	W±0.2	H±0.1	S±0.3	W1±0.1
B1S	3.5	2.8	1.1	0.8	2.2

✻ Externals of figure are the reference.

Characteristics list

Series	Rated voltage (V.DC)	Rated temp. (°C)	Category voltage (V.DC)	Category temp. (°C)	Rated capacitance (µF)	Case size (mm) L	W	H	Size code	Specifications Ripple *1 current (mArr.m.s.)	ESR *2 (mΩ max.)	tan δ *3	LC *4 (µA)	Standard Part number	Min. Packaging Q'ty (pcs)
TQS	16	105	16.0	105	33	3.5	2.8	1.1	B1S	1000	100	0.10	52.8	16TQS33MBD	2500
	25	105	25.0	105	10	3.5	2.8	1.1		1000	100	0.10	25.0	25TQS10MED	2500
	35	105	35.0	105	6.8	3.5	2.8	1.1		900	150	0.10	23.8	35TQS6R8MHD	2500

✻1 Ripple current (100 kHz/ +105 °C), ✻2 ESR (100 kHz/+20 °C) ✻3 tan δ (120 Hz/+20 °C) ✻4 After 5 minutes

◆ Please refer to each page in this catarog for “Reflow conditions” and “Taping specifications”.

Surface Mount Type

Series : **TPB**

POSCAP

Features

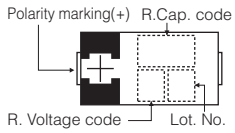
- Standard
- RoHS compliance, Halogen free

Specifications

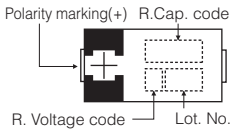
Size code	B2	D3L	D4
Category temperature range	–55 °C to +105 °C		
Rated voltage range	4 V.DC to 10 V.DC		6.3 V.DC to 10 V.DC
Category voltage range	4 V.DC to 10 V.DC		6.3 V.DC to 10 V.DC
Rated capacitance range	33 µF to 68 µF	150 µF to 330 µF	220 µF to 470 µF
Capacitance tolerance	±20 % (120 Hz / + 20 °C)		
Leakage current	Please see the attached characteristics list		
Dissipation factor (tan δ)	Please see the attached characteristics list		
Surge voltage (V.DC)	Rated voltage × 1.15		
Endurance	+105 °C 2000h, (B2 size : 1000h) rated voltage appled ✻ Rated temp. +85 °C 1000h rated voltage applied		
	Capacitance change	Within ±20 % of the initial value	
	tan δ	≦ 1.5 times of the initial limit	
	DC leakage current	Within the initial limit	
Damp heat (Steady State)	+60 °C, 90 % to 95 %, 500 h, No-applied voltage		
	Capacitance change	Within +40 %, –20 % of the initial value	
	tan δ	≦ 1.5 times of the initial limit	
	DC leakage current	≦ 3 times of the initial limit	

Marking

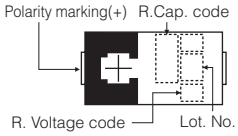
B2 Size



D4 Size



D3L Size

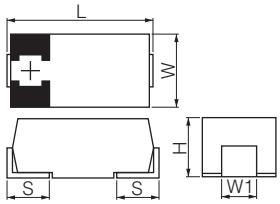


R. Voltage (V.DC)	4.0	6.3	10.0
Code	g	j	A

B2 Size

R. Cap. (µF)	33	47	68
Code	N7	S7	W7

Dimensions (not to scale)



Unit : mm

Size code	L±0.3✻1	W±0.2	H±0.2✻2	S±0.2	W1±0.1
B2	3.5	2.8	1.9	0.8	2.2
D3L	7.3	4.3	2.8	1.3	2.4
D4	7.3	4.3	3.8	1.3	2.4

✻ Externals of figure are the reference.
✻ 1 ±0.2 : B2 ✻ 2 ±0.1 : B2

Characteristics list

Series	Rated voltage (V.DC)	Rated temp. (°C)	Category voltage (V.DC)	Category temp. (°C)	Rated capacitance (µF)	Case size (mm) L	W	H	Size code	Specifications Ripple ✻1 current (mArr.m.s.)	ESR ✻2 (mΩ max.)	tan δ ✻3	LC ✻4 (µA)	Standard Part number	Min. Packaging Q'ty (pcs)
TPB	4.0	105	4.0	105	68	3.5	2.8	1.9	B2	1100	70	0.08	27.2	4TPB68M	2000
		105	4.0	105	330	7.3	4.3	2.8	D3L	2000	40	0.10	132.0	4TPB330ML	2500
	6.3	105	6.3	105	68	3.5	2.8	1.9	B2	1100	70	0.08	42.8	6TPB68M	2000
		105	6.3	105	220	7.3	4.3	2.8	D3L	2000	40	0.10	138.6	6TPB220ML	2500
		85	5.0	105	330	7.3	4.3	2.8		2000	40	0.10	207.9	6TPB330MAL	2500
		105	6.3	105		7.3	4.3	2.8		2000	40	0.10	207.9	6TPB330ML	2500
		105	6.3	105		7.3	4.3	3.8	D4	3000	40	0.10	207.9	6TPB330M	2000
		105	6.3	105	470	7.3	4.3	3.8		3000	35	0.15	296.1	6TPB470M	2000
	10	105	10.0	105	33	3.5	2.8	1.9	B2	1100	70	0.08	33.0	10TPB33M	2000
		105	10.0	105	47	3.5	2.8	1.9		1100	70	0.08	47.0	10TPB47M	2000
		105	10.0	105	150	7.3	4.3	2.8	D3L	2000	40	0.10	150.0	10TPB150ML	2500
		105	10.0	105	220	7.3	4.3	2.8		2000	40	0.10	220.0	10TPB220ML	2500
		105	10.0	105		7.3	4.3	3.8	D4	3000	40	0.10	220.0	10TPB220M	2000
		105	10.0	105	330	7.3	4.3	3.8		3000	35	0.10	330.0	10TPB330M	2000

✻1 Ripple current (100 kHz/ +45 °C), ✻2 ESR (100 kHz/+20 °C) ✻3 tan δ (120 Hz/+20 °C) ✻4 After 5 minutes

◆ Please refer to each page in this catarog for “Reflow conditions” and “Taping specifications”.

Surface Mount Type

Series : **TPC**

POSCAP

Features

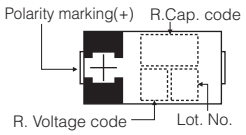
- Low profile (Height 1.1 mm)
- RoHS compliance, Halogen free

Specifications

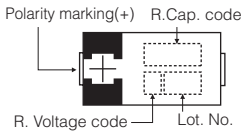
Size code	B1	D2
Category temperature range	–55 °C to +105 °C	
Rated voltage range	6.3 V.DC to 12.5 V.DC	6.3 V.DC to 10 V.DC
Category voltage range	5.0 V.DC to 10.0 V.DC	6.3 V.DC to 10 V.DC
Rated capacitance range	10 µF to 47 µF	68 µF to 330 µF
Capacitance tolerance	±20 % (120 Hz / + 20 °C)	
Leakage current	Please see the attached characteristics list	
Dissipation factor (tan δ)	Please see the attached characteristics list	
Surge voltage (V.DC)	Rated voltage × 1.15	
Endurance	+105 °C 2000h, (B1 size : 1000h) rated voltage appled ✻ Rated temp. +85 °C 1000h rated voltage applied	
	Capacitance change	Within ±20 % of the initial value
	tan δ	≦ 1.5 times of the initial limit
	DC leakage current	Within the initial limit
Damp heat (Steady State)	+60 °C, 90 % to 95 %, 500 h, No-applied voltage	
	Capacitance change	Within +40 %, –20 % of the initial value
	tan δ	≦ 1.5 times of the initial limit
	DC leakage current	≦ 3 times of the initial limit

Marking

B1 Size



D2 Size

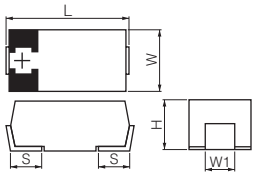


R. Voltage (V.DC)	6.3	8.0	10.0	12.5
Code	j	k	A	B

B1 Size

R. Cap. (µF)	10	15	22	33	47
Code	A7	E7	J7	N7	S7

Dimensions (not to scale)



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
D2	7.3	4.3	1.9	1.3	2.4

✻ Externals of figure are the reference.

Characteristics list

Series	Rated voltage (V.DC)	Rated temp. (°C)	Category voltage (V.DC)	Category temp. (°C)	Rated capacitance (µF)	Case size (mm) L	W	H	Size code	Specifications Ripple *1 current (mArm.s.)	ESR *2 (mΩ max.)	tan δ *3	LC *4 (µA)	Standard Part number	Min. Packaging Q'ty (pcs)
TPC	6.3	85	5.0	105	47	3.5	2.8	1.1	B1	1100	55	0.10	29.6	6TPC47M	3000
		85	5.0	105		3.5	2.8	1.1		1000	70	0.10	29.6	6TPC47MB	3000
		105	6.3	105	100	7.3	4.3	1.9	D2	1700	45	0.10	63.0	6TPC100M	3000
		105	6.3	105	150	7.3	4.3	1.9	D2	1900	40	0.10	94.5	6TPC150M	3000
		85	5.0	105	330	7.3	4.3	1.9	D2	1900	40	0.10	207.9	6TPC330MA	3000
	8.0	85	6.3	105	22	3.5	2.8	1.1	B1	1000	70	0.10	17.6	8TPC22M	3000
		105	8.0	105	150	7.3	4.3	1.9	D2	1900	40	0.10	120.0	8TPC150M	3000
	10	105	10.0	105	68	7.3	4.3	1.9	D2	1700	45	0.10	68.0	10TPC68M	3000
		105	10.0	105	100	7.3	4.3	1.9	D2	1700	45	0.10	100.0	10TPC100M	3000
	12.5	85	10.0	105	10	3.5	2.8	1.1	B1	800	80	0.10	12.5	12TPC10M	3000
		85	10.0	105	15	3.5	2.8	1.1	B1	800	80	0.10	18.8	12TPC15M	3000

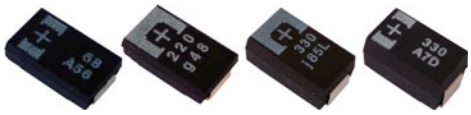
✻1 Ripple current (100 kHz/ +45 °C), ✻2 ESR (100 kHz/+20 °C) ✻3 tan δ (120 Hz/+20 °C) ✻4 After 5 minutes

◆ Please refer to each page in this catarog for “Reflow conditions” and “Taping specifications”.

Surface Mount Type

Series : **TH**

POSCAP



Features

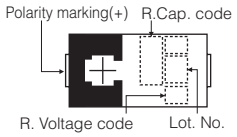
- Guaranteed at 125 °C, 1000h
- RoHS compliance, Halogen free

Specifications

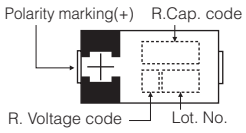
Size code	D2E	D2	D3L	D4
Category temperature range	–55 °C to +125 °C			
Rated voltage range	2.5 V.DC to 6.3 V.DC	2.5 V.DC to 10 V.DC	4 V.DC to 6.3 V.DC	6.3 V.DC to 10 V.DC
Category voltage range	1.6 V.DC to 4.0 V.DC	1.6 V.DC to 6.3 V.DC	2.5 V.DC to 4.0 V.DC	4.0 V.DC to 6.3 V.DC
Rated capacitance range	150 µF to 330 µF	68 µF to 220 µF	220 µF to 330 µF	220 µF to 470 µF
Capacitance tolerance	±20 % (120 Hz / + 20 °C)			
Leakage current	Please see the attached characteristics list			
Dissipation factor (tan δ)	Please see the attached characteristics list			
Surge voltage (V.DC)	Rated voltage × 1.15			
Endurance	+125 °C 1000h, category voltage appled			
	Capacitance change	Within ±20 % of the initial value		
	tan δ	≦ 2 times of the initial limit		
	DC leakage current	≦ 2 times of the initial limit		
Damp heat (Steady State)	+60 °C, 90 % to 95 %, 500 h, No-applied voltage			
	Capacitance change	Within +40 %, –20 % of the initial value		
	tan δ	≦ 1.5 times of the initial limit		
	DC leakage current	≦ 3 times of the initial limit		

Marking

D2E, D3L Size

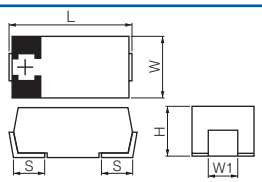


D2, D4 Size



R. Voltage (V.DC)	2.5	4.0	6.3	10
Code	e	g	j	A

Dimensions (not to scale)



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

✻ Externals of figure are the reference. ✻ 1 ±0.2 : D2 ✻ 2 ±0.2 :D3L, D4

Characteristics list

Series	Rated voltage (V.DC)	Rated temp. (°C)	Category voltage (V.DC)	Category temp. (°C)	Rated capacitance (µF)	Case size (mm) L	W	H	Size code	Specifications Ripple *1 current (mArr.m.s.)	ESR *2 (mΩ max.)	tan δ *3	LC *4 (µA)	Standard Part number	Min. Packaging Q'ty (pcs)
THB	4.0	105	2.5	125	330	7.3	4.3	2.8	D3L	2000	40	0.10	132.0	4THB330ML	2500
	6.3	105	4.0	125	220	7.3	4.3	2.8	D3L	2000	40	0.10	138.6	6THB220ML	2500
		105	4.0	125	330	7.3	4.3	3.8	D4	3000	40	0.10	207.9	6THB330M	2000
		105	4.0	125	470	7.3	4.3	3.8	D4	3000	35	0.10	296.1	6THB470M	2000
	10	105	6.3	125	220	7.3	4.3	3.8	D4	3000	40	0.10	220.0	10THB220M	2000
		105	6.3	125	330	7.3	4.3	3.8	D4	3000	35	0.10	330.0	10THB330M	2000
THC	2.5	105	1.6	125	220	7.3	4.3	1.9	D2	1700	45	0.10	55.0	2R5THC220M	3000
	6.3	105	4.0	125	150	7.3	4.3	1.9	D2	1900	40	0.10	94.5	6THC150M	3000
	10	105	6.3	125	68	7.3	4.3	1.9	D2	1700	45	0.10	68.0	10THC68M	3000
THE	2.5	105	1.6	125	330	7.3	4.3	1.8	D2E	3100	15	0.10	82.5	2R5THE330MF	3000
		105	1.6	125		7.3	4.3	1.8	D2E	2800	18	0.10	82.5	2R5THE330MI	3000
		105	1.6	125		7.3	4.3	1.8	D2E	2400	25	0.10	82.5	2R5THE330M	3000
	4.0	105	2.5	125	220	7.3	4.3	1.8	D2E	3100	15	0.10	88.0	4THE220MF	3000
		105	2.5	125		7.3	4.3	1.8	D2E	2800	18	0.10	88.0	4THE220MI	3000
		105	2.5	125		7.3	4.3	1.8	D2E	2400	25	0.10	88.0	4THE220M	3000
	6.3	105	4.0	125	150	7.3	4.3	1.8	D2E	2800	18	0.10	94.5	6THE150MI	3000
		105	4.0	125		7.3	4.3	1.8	D2E	2400	25	0.10	94.5	6THE150M	3000

✻1 Ripple current (100 kHz/ +45 °C), ✻2 ESR (100 kHz/+20 °C) ✻3 tan δ (120 Hz/+20 °C) ✻4 After 5 minutes

◆ Please refer to each page in this catarog for “Reflow conditions” and “Taping specifications”.

Surface Mount Type

Series : **TC**

POSCAP

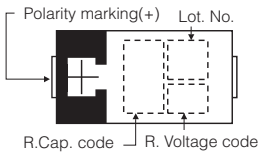
Features

- Guaranteed at 125 °C
- RoHS compliance, Halogen free

Specifications

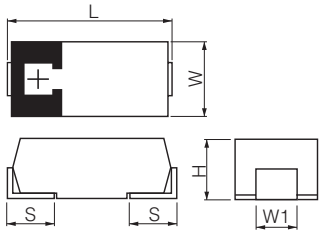
Size code	D2E	D3L	D4
Category temperature range	–55 °C to +125 °C		
Rated voltage range	4 V.DC to 6.3 V.DC	2.5 V.DC to 10 V.DC	
Category voltage range	3.2 V.DC to 5.0 V.DC	2.0 V.DC to 8.0 V.DC	
Rated capacitance range	100 µF to 330 µF	150 µF to 680 µF	330 µF to 1000 µF
Capacitance tolerance	±20 % (120 Hz / + 20 °C)		
Leakage current	Please see the attached characteristics list		
Dissipation factor (tan δ)	Please see the attached characteristics list		
Surge voltage (V.DC)	Rated voltage × 1.15		
Endurance	+125 °C, 1000 h Category temperature range voltage applied		
	Capacitance change	Within ±20 % of the initial value	
	tan δ	≦ 2 times of the initial limit	
	DC leakage current	≦ 2 times of the initial limit	
Damp heat (Steady State)	+60 °C, 90 % to 95 %, 500 h, No-applied voltage		
	Capacitance change	Within +50 %, –20 % of the initial value (ETCF1000M6H (5H))	
		Within +40 %, –20 % of the initial value (Except for above model)	
	tan δ	≦ 1.5 times of the initial limit	
	DC leakage current	≦ 3 times of the initial limit	

Marking



R. Voltage (V.DC)	2.5	4.0	6.3	10.0
Code	e	g	j	A

Dimensions (not to scale)



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

✻ Externals of figure are the reference.
✻ 1 ±0.1 : D2E

Characteristics list

Series	Rated voltage (V.DC)	Rated temp. (°C)	Category voltage (V.DC)	Category temp. (°C)	Rated capacitance (µF)	Case size (mm) L	W	H	Size code	Specifications Ripple *1 current (mArm.s.)	ESR *2 (mΩ max.)	tan δ *3	LC *4 (µA)	Standard Part number	Min. Packaging Q'ty (pcs)
TCE	2.5	105	2.0	125	680	7.3	4.3	2.8	D3L	3500	12	0.10	170.0	ETCE680MCL	2500
		105	2.0	125		7.3	4.3	2.8		3100	15	0.10	170.0	ETCE680MFL	2500
		105	2.0	125	1000	7.3	4.3	3.8	D4	3900	15	0.15	250.0	ETCE1000MF	2000
	4	105	3.2	125	150	7.3	4.3	1.8	D2E	2800	18	0.10	60.0	4TCE150MI	3000
		105	3.2	125	220	7.3	4.3	1.8		3100	15	0.10	88.0	4TCE220MF	3000
		105	3.2	125		7.3	4.3	1.8		2800	18	0.10	88.0	4TCE220MI	3000
		105	3.2	125		7.3	4.3	1.8		2400	25	0.10	88.0	4TCE220M	3000
		105	3.2	125	330	7.3	4.3	1.8		2800	18	0.10	132.0	4TCE330MI	3000
		105	3.2	125		7.3	4.3	1.8		2400	25	0.10	132.0	4TCE330M	3000
		105	3.2	125	470	7.3	4.3	2.8	D3L	3500	12	0.10	188.0	4TCE470MCL	2500
		105	3.2	125		7.3	4.3	2.8		3100	15	0.10	188.0	4TCE470MFL	2500
		105	3.2	125		7.3	4.3	2.8		2800	18	0.10	188.0	4TCE470MIL	2500
		105	3.2	125		7.3	4.3	2.8		2400	25	0.10	188.0	4TCE470ML	2500
	6.3	105	5.0	125	100	7.3	4.3	1.8	D2E	2800	18	0.10	63.0	6TCE100MI	3000
		105	5.0	125		7.3	4.3	1.8		2400	25	0.10	63.0	6TCE100M	3000
		105	5.0	125	150	7.3	4.3	1.8		3100	15	0.10	94.5	6TCE150MF	3000
		105	5.0	125		7.3	4.3	1.8		2800	18	0.10	94.5	6TCE150MI	3000
		105	5.0	125		7.3	4.3	1.8		2400	25	0.15	94.5	6TCE150M	3000
		105	5.0	125	220	7.3	4.3	1.8		2800	18	0.15	138.6	6TCE220MI	3000
		105	5.0	125		7.3	4.3	1.8		2400	25	0.15	138.6	6TCE220M	3000
		105	5.0	125	330	7.3	4.3	2.8	D3L	3100	15	0.10	207.9	6TCE330MFL	2500
		105	5.0	125		7.3	4.3	2.8		2800	18	0.10	207.9	6TCE330MIL	2500
		105	5.0	125		7.3	4.3	2.8		2400	25	0.10	207.9	6TCE330ML	2500
		105	5.0	125	470	7.3	4.3	3.8	D4	3500	18	0.15	296.1	6TCE470MI	2000
		105	5.0	125		7.3	4.3	3.8		3000	25	0.15	296.1	6TCE470M	2000
		105	5.0	125	680	7.3	4.3	3.8		3500	18	0.15	428.4	6TCE680MI	2000
		105	5.0	125		7.3	4.3	3.8		3000	25	0.15	428.4	6TCE680M	2000
	10	105	8.0	125	220	7.3	4.3	2.8	D3L	2800	18	0.10	220.0	10TCE220MIL	2500
		105	8.0	125		7.3	4.3	2.8		2400	25	0.10	220.0	10TCE220ML	2500
		105	8.0	125	330	7.3	4.3	3.8	D4	3000	25	0.10	330.0	10TCE330M	2000
TCF	2.5	105	2.0	125	680	7.3	4.3	2.8	D3L	4400	6	0.10	170.0	ETCF680M6L	2500
		105	2.0	125		7.3	4.3	2.8		4400	7	0.10	170.0	ETCF680M7L	2500
		105	2.0	125		7.3	4.3	2.8		4400	10	0.10	170.0	ETCF680ML	2500
		105	2.0	125		7.3	4.3	3.8	D4	6100	5	0.10	170.0	ETCF680M5H	2000
		105	2.0	125	1000	7.3	4.3	3.8		6100	5	0.10	250.0	ETCF1000M5H	2000
		105	2.0	125		7.3	4.3	3.8		5600	6	0.10	250.0	ETCF1000M6H	2000
	4	105	3.2	125	330	7.3	4.3	2.8	D3L	4000	12	0.10	132.0	4TCF330ML	2500
		105	3.2	125	470	7.3	4.3	2.8		4400	10	0.10	188.0	4TCF470ML	2500
		105	3.2	125	680	7.3	4.3	3.8	D4	4400	10	0.10	272.0	4TCF680MAH	2000
	6.3	105	5.0	125	220	7.3	4.3	2.8	D3L	6100	5	0.10	138.6	6TCF220M5L	2500
		105	5.0	125		7.3	4.3	2.8		4600	9	0.10	138.6	6TCF220M9L	2500
		105	5.0	125		7.3	4.3	2.8		4000	12	0.10	138.6	6TCF220ML	2500
		105	5.0	125	330	7.3	4.3	2.8		3900	9	0.10	207.9	6TCF330M9L	2500
		105	5.0	125	470	7.3	4.3	3.8	D4	4400	10	0.10	296.1	6TCF470MAH	2000
	10	105	10.0	125	150	7.3	4.3	2.8	D3L	3600	15	0.10	150.0	10TCF150ML	2500

✻1 Ripple current (100 kHz/ +45 °C), ✻2 ESR (100 kHz/+20 °C) ✻3 tan δ (120 Hz/+20 °C) ✻4 After 5 minutes

◆ Please refer to each page in this catarog for “Reflow conditions” and “Taping specifications”.

Deletion models

The following table is a list of our items which have been deleted from our catalogs.
If you are using any of the following models on the deleted list,
please substitute them with the suggested alternative model as soon as possible.
Our company continue to supply them to customers who have already used them, for the time being.

Series	Size code	Models for deletion	Year of deletion	Alternative model
TPB	B2	8TPB47M	2009	10TPB47M
		6TPB100MA	2009	6TPE100MAZB
		6TPB100MAV	2009	6TPE100MAZB
		6TPB47M	2009	6TPC47MB
		4TPB100M	2009	4TPE100MZB
		2R5TPB220MA	2009	2R5TPE220MZB
		2R5TPB100M	2012	4TPE100MZB
	D3L	10TPB100ML	2010	10TPC100M
		6TPB150ML	2009	6TPC150M
		4TPB470ML	2009	4TPE470ML
		4TPB220ML	2009	4TPE220M
		2R5TPB330ML	2009	2R5TPE330M
	D3	10TPB100M	2008	10TPC100M
		6TPB150M	2008	6TPC150M
		4TPB220M	2008	4TPE220M
	D4	4TPB680M	2009	6TPE680MI
		4TPB470M	2009	4TPE470ML
		2R5TPB1000M	2009	2R5TPE1000MF
		2R5TPB680M	2009	2R5TPE680MFL
TPC	B1	10TPC33MB	2013	12TPG33M
		6TPC33M	2012	6TPC47MB
		4TPC47M	2012	6TPC47MB
		2R5TPC56M	2012	6TPB68M
	D2	4TPC220M	2009	4TPE220M
		4TPC150M	2009	4TPE150MI
		2R5TPC330M	2009	2R5TPE330M
TPE	B2	6TPE100MZB	2011	6TPE100MPB
		4TPE150MUB	2013	4TPE150MAZB
		2R5TPE220MIB	2012	2R5TPE220MFGB
		2R5TPE220MDGB	2013	2R5TPE220MFGB
		2R5TPE150MZB	2011	2R5TPE220MZB
		2TPE330MIB	2011	2TPE330MFB
		2TPE330MAFGB	2011	2TPE330MAFB
	D2E	4TPE150M	2011	4TPE150MI
		2R5TPE470M	2011	2R5TPE470MI
		2TPE470M9	2011	2R5TPE470M9
		2TPE470M7	2011	2R5TPE470M7
		2TPE470M6	2011	2R5TPF470M6L
		2TPE330M9	2011	2R5TPE330M9
		2TPE330M7	2011	2R5TPE330M7
		2TPE330M6	2011	2TPF330M6
		2R5TPE220MC	2012	2R5TPE220M9
		2R5TPE220M7	2012	2R5TPE330M7

Series	Size code	Models for deletion	Year of deletion	Alternative model
TPE	D3L	2R5TPE680ML	2012	2R5TPE680MFL
		2R5TPE680MIL	2011	2R5TPE680MFL
	D4	4TPE680M	2011	6TPE680MI
		4TPE680MI	2012	6TPE680MI
		4TPE680MF	2012	4TPF680MAH
		2R5TPE1000M	2011	2R5TPE1000MF
		2R5TPE1000MI	2012	2R5TPE1000MF
TPF	D3L	6TPF330M5EL	2014	-
		4TPF470M5EL	2014	-
TPG	B1G	10TPG33M	2011	10TPC33MB
	B15G	6TPG220MZG	2014	-
TPL	D12T	All models	2013	-
	D15T	All models	2013	-
	D2T	All models	2013	-
TPLF	D2T	All models	2013	-
TPSF	B1S	ETPSF200M9ED	2014	-
	B2S	11TPSF62MAIG	2012	-
TPH	A14	ETPH220MAZC	2013	-
TPU	S09	2R5TPU22MSI	2011	6TPU22MSI
		4TPU15MSI	2011	6TPU22MSI
		4TPU33MSI	2011	6TPU47MSI
	S11	6TPU33MSK	2013	6TPU47MSI
		4TPU47MSK	2013	6TPU47MSI
		2R5TPU68MSK	2013	4TPU68MSI
	A09	10TPU33MAI	2011	ATPH33MAHA
		6TPU47MAI	2011	6TPH47MHA
		4TPU68MAI	2011	4TPH68MHA
		2R5TPU100MAI	2011	ETPH100MHA
TH	D2	4THC220M	2013	4THE220M
	D3L	10THB100ML	2010	-
		2R5THB330ML	2010	-
	D4	4THB680M	2013	-
TQC	C	25TQC10M	2011	25TQC15MYFD
		20TQC15M	2011	25TQC15MYFD
		16TQC22M	2011	25TQC22MYFD
	D2	25TQC15M	2012	25TQC15MYFD
		25TQC22M	2012	25TQC22MYFD
		20TQC22M	2012	25TQC22MYFD
		20TQC22MYFD	2015	25TQC22MYFD
		20TQC47MY	2012	20TQC47MYF
		16TQC33M	2012	16TQC33MYFD
		16TQC47M	2012	16TQC47MYFD
		16TQC68MY	2012	16TQC68MYF
	D3L	25TQC33M	2012	25TQC33MYF
		20TQC47M	2012	20TQC47MYF
		16TQC68M	2012	16TQC68MYF
	D3	16TQC100M	2012	16TQC100MYF
	B15	35TQC2R7MYF	2016	35TQS6R8MHD

EOL models

The following table is a list of the End-Of-Life (EOL) models.
Sales of these items will end as soon as we run out of its stock.
We would like to express our appreciation for your business over the years with these products and we hope the new, alternative parts will continue to serve your needs.
Thank you very much.

Series	Size code	Models for deletion	Year of deletion	Alternative model
TPA	C	10TPA33M	2012/9	10TPB33M
		6TPA47M	2012/9	10TPB47M
	D3	10TPA100M	2012/9	10TPC100M
		6TPA150M	2012/9	6TPC150M
		4TPA220M	2012/9	4TPE220M
TPB	B2	8TPB33M	2012/9	10TPB33M
		4TPB150MA	2012/9	4TPE150MAZB
		4TPB100MV	2012/9	4TPE100MZB
	C	10TPB220MC	2009/10	-
		10TPB68MC	2012/9	10TPC68M
		10TPB47MC	2012/9	10TPC68M
		8TPB82MC	2012/9	8TPE100MAZB
		6TPB150MC	2012/9	6TPE150M
		6TPB100MC	2012/9	6TPG100MG
		4TPB220MC	2012/9	4TPE220MI
		4TPB150MC	2012/9	6TPE150M
		2R5TPB220MC	2012/9	4TPE220MI
	D3L	16TPB47ML	2003/6	16TQC47MYFD
		2R5TPB680ML	2012/9	2R5TPE680MFL
		2R5TPB470ML	2012/9	2R5TPE470MI
	D3	16TPB47M	2003/6	16TQC47MYFD
		2R5TPB330M	2012/9	2R5TPE330M
TPC	C1	8TPC33M	2012/9	12TPG33M
		6TPC100MC	2012/9	6TPG100MG
		6TPC68M	2012/9	6TPG100MG
		4TPC100M	2012/9	6TPG100MG
		4TPC56M	2012/9	-
		2R5TPC82M	2012/9	-
	D2	16TPC33M	2003/6	16TQC33MYFD
		2R5TPC220M	2012/9	2R5TPE220M
TPD	D4D	10TPD150M	2007/10	10TPF150ML
		6TPD470M	2012/3	6TPF470MAH
		6TPD330M	2007/10	6TPF330M9L
		6TPD220M	2007/10	6TPF220ML
		4TPD680M	2012/3	4TPF680MAH
		4TPD470M	2007/10	4TPF470ML
		4TPD330M	2007/10	4TPF330ML
		2R5TPD1000M	2012/3	ETPF1000M6H
		2R5TPD1000M8	2012/3	ETPF1000M6H
		2R5TPD1000M6	2012/3	ETPF1000M6H
		2R5TPD1000M5	2012/3	ETPF1000M5H
		2R5TPD680M	2007/10	2R5TPF680ML
		2R5TPD680M8	2007/10	2R5TPF680M7L
		2R5TPD680M6	2012/3	2R5TPF680M6L
		2R5TPD680M5	2012/3	ETPF680M5H
		2R5TPD470M	2007/10	2R5TPF470ML
		2R5TPD470M8	2007/10	2R5TPF470M7L
		2R5TPD470M6	2012/3	2R5TPF470M6L
		2R5TPD470M5	2012/3	ETPF470M5H

Series	Size code	Models for deletion	Year of deletion	Alternative model
TPE	B2	2R5TPE220MPB	2012/9	2R5TPE220MLB
	C2	8TPE100MPC2	2012/9	10TPF150ML
		6TPE150MPC2	2012/9	6TPE150M
		6TPE150MIC2	2012/9	6TPE150MI
		4TPE220MPC2	2012/9	4TPE220MI
		4TPE220MIC2	2012/9	4TPE220MI
		4TPE220MFC2	2012/9	4TPE220MF
		2R5TPE330MIC2	2012/9	2R5TPE330MF
		2R5TPE330MFC2	2012/9	2R5TPE330MF
		2R5TPE330MCC2	2012/9	2R5TPE330MC
		2R5TPE330M9C2	2012/9	2R5TPE330M9
	C3	10TPE180MGC	2012/9	10TPE220ML
		10TPE150MGC	2012/9	10TPE220ML
		6TPE220MPC	2012/9	6TPE220M
		6TPE220MIC	2012/9	6TPE220MI
		6TPE150MPC	2012/9	6TPE150M
		4TPE220MPC	2012/9	4TPE220MI
		4TPE220MIC	2012/9	4TPE220MI
		2R5TPE330MPC	2012/9	2R5TPE330MF
		2R5TPE330MIC	2012/9	2R5TPE330MF
		2R5TPE330MFC	2012/9	2R5TPE330MF
TPF	D2E	2TPF470M6	2012/9	2R5TPF470M6L
TPG	B1G	6TPG68MG	2012/9	6TPG100M
		4TPG150M	2012/9	6TPG150M
TPL	D2T	2R5TPL330M7	2011/7	-
		2R5TPL220MC	2012/9	-
TPLF	D2T	2TPLF560M6	2011/7	-
		2TPLF470M7	2012/9	-
TPSF	B2S	2TPSF270MC	2012/9	2TPSF270M9G
		2TPSF270M9	2012/9	2TPSF270M9G
TPU	S08	6TPU10M	2012/9	6TPU10MSI
		4TPU15M	2012/9	6TPU22MSI
		2R5TPU22M	2012/9	6TPU22MSI
	S11	6TPU22MSK	2012/9	6TPU22MSI
		4TPU33MSK	2012/9	6TPU47MSI
		2R5TPU47MSK	2012/9	2R5TPU47MSI
	B09	8TPU33MBI	2012/9	ATPH33MAHA
		6TPU47MBI	2012/9	6TPH47MHA
		4TPU68MBI	2012/9	4TPH68MHA
TH	D3L	2R5THB470ML	2012/9	6THB470M
	D4	2R5THB1000M	2012/9	-
		2R5THB680M	2012/9	-
	D4D	6THD330M	2012/3	6TPF330M9L
		4THD470M	2012/9	-
		2R5THD680M	2012/3	2R5TPF680M6L
TR		TR series	-	TA series
APA	D2A	APA series	2006/4	-
APB	D1	APB series	2006/4	-
APC	D2	APC series	2009/6	-
APD	D1	APD series	2009/6	-

CAUTION AND WARNING

1. The electronic components contained in this catalog are designed and produced for use in home electric appliances, office equipment, information equipment,communications equipment, and other general purpose electronic devices.
   Before use of any of these components for equipment that requires a high degree of safety, such as medical instruments, aerospace equipment, disaster-prevention equipment, security equipment, vehicles (automobile, train, vessel),
   please be sure to contact our sales representative corporation.

2. When applying one of these components for equipment requiring a high degree of safety, no matter what sort of application it might be, be sure to install a protective circuit or redundancy arrangement to enhance the safety of your equipment. In addition, please carry out the safety test on your own responsibility.

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● Please contact

● Factory

Device Solutions Business Division
Automotive & Industrial Systems Company
Panasonic
1006 Kadoma, Kadoma City, Osaka 571-8506, JAPAN

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