

# Panasonic

INDUSTRY

2019

Conductive Polymer Tantalum  
Solid Capacitors

Products Catalog

# POSCAP

2019.10



**Guidelines and precautions regarding the technical information and use of our products described in this online catalog.**

- If you want to use our products described in this online catalog for applications requiring special qualities or reliability, or for applications where the failure or malfunction of the products may directly jeopardize human life or potentially cause personal injury (e.g. aircraft and aerospace equipment, traffic and transportation equipment, combustion equipment, medical equipment, accident prevention, anti-crime equipment, and/or safety equipment), it is necessary to verify whether the specifications of our products fit to such applications. Please ensure that you will ask and check with our inquiry desk as to whether the specifications of our products fit to such applications use before you use our products.
- The quality and performance of our products as described in this online catalog only apply to our products when used in isolation. Therefore, please ensure you evaluate and verify our products under the specific circumstances in which our products are assembled in your own products and in which our products will actually be used.
- If you use our products in equipment that requires a high degree of reliability, regardless of the application, it is recommended that you set up protection circuits and redundancy circuits in order to ensure safety of your equipment.
- The products and product specifications described in this online catalog are subject to change for improvement without prior notice. Therefore, please be sure to request and confirm the latest product specifications which explain the specifications of our products in detail, before you finalize the design of your applications, purchase, or use our products.
- The technical information in this online catalog provides examples of our products' typical operations and application circuits. We do not guarantee the non-infringement of third party's intellectual property rights and we do not grant any license, right, or interest in our intellectual property.
- If any of our products, product specifications and/or technical information in this online catalog is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially with regard to security and export control, shall be observed.

**<Regarding the Certificate of Compliance with the EU RoHS Directive/REACH Regulations>**

- The switchover date for compliance with the RoHS Directive/REACH Regulations varies depending on the part number or series of our products.
- When you use the inventory of our products for which it is unclear whether those products are compliant with the RoHS Directive/REACH Regulation, please select "Sales Inquiry" in the website inquiry form and contact us.

**We do not take any responsibility for the use of our products outside the scope of the specifications, descriptions, guidelines and precautions described in this online catalog.**

## 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 and (EU)2015/863)).
- No Ozone Depleting Chemicals(ODC's), controlled under the Montreal Protocol Agreement, are used in producing this product.  
We do not use 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.
- These products are not dangerous goods on the transportation as identified by UN(United Nations) numbers or UN classification.

### ■ 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.

### ■ Intellectual property rights and licenses

- The technical information in this specification provides examples of our products' typical operations and application circuits. We do not guarantee the non-infringement of third party's intellectual property rights and we do not grant any license, right, or interest in our intellectual property.

## Items to be observed

### ■ For specification

- This specification guarantees the quality and performance of the product as individual components. The durability differs depending on the environment and the conditions of usage. Before use, check and evaluate their compatibility with actual conditions when installed in the products. When safety requirements cannot be satisfied in your technical examination, inform us immediately.
- Do not use the products beyond the specifications described in this document.

### ■ Upon application to products where safety is regarded as important

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.

- (1) The system is equipped with a protection circuit and protection device.
- (2) 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<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, or NO<sub>x</sub>.
  - (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 solvent, 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 where strays acid or alkaline.
  - (9) Using in the atmosphere where 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.

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## ⚠ 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) Coupling circuit
- (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.

#### 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.

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

- (1) Set the operating temperature so that it falls within the range stipulated in this delivery specification.
- (2) 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.)
- (3) Specified ESR is a value at the time of shipping from factory. ESR may change upon use conditions.

### 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 of unopened as 18 months or shorter after shipment from factory.
  - 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 use up POSCAP in the storage bag.

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

POSCAP is not compatible with JEDEC J-STD-020, J-STD-033

### \* 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.

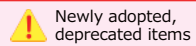
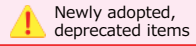
Representative patents relating to POSCAP are as follows:

US Patent No.6508800, No.6891717, No.7158368, No.7326260号, No.8081421, No.8149569, No.8456804, No.8559166

### Line up

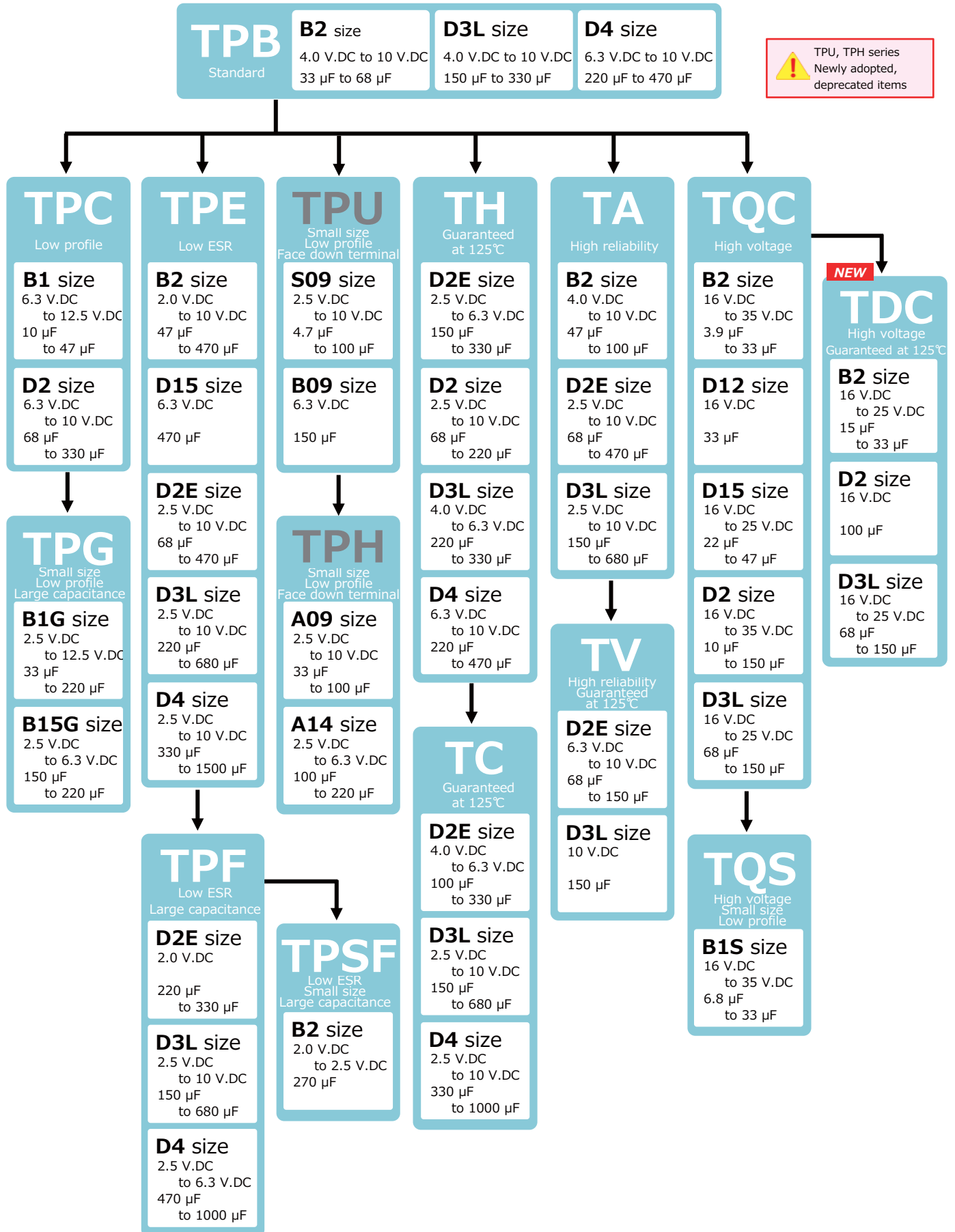
Series	Features	Small size/Low profile	Large capacitance	Low ESR	High reliability	High voltage	Guaranteed at 125°C	Category temp. range (°C)	Rated voltage (V.DC)	ESR (mΩ)	Capacitance (μF)	Size code	Size (mm)		
													L	W	H
TPG	Small size Low profile Large capacitance	●	●					-55 to 105	2.5 to 12.5	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
TQS	High voltage Small size/Low profile	●				●		-55 to 105	16 to 35	70 to 150	6.8 to 33	B1S	3.5	2.8	1.1
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
TA	High reliability						●	-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°C			●			●	-55 to 125	6.3 to 10	25	68 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	High reliability	High voltage	Guaranteed at 125°C	Category temp. range (°C)	Rated voltage (V.DC)	ESR (mΩ)	Capacitance (μF)	Size code	Size (mm)		
													L	W	H
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
TH	Guaranteed at 125°C						●	-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°C						●	-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
<b>NEW</b> TDC	High voltage Guaranteed at 125°C						● ●	-55 to 125	16 to 25	90 to 100	15 to 33	B2	3.5	2.8	1.9
								-55 to 125	16	50	100	D2	7.3	4.3	1.9
								-55 to 125	16 to 25	50 to 70	68 to 150	D3L	7.3	4.3	2.8
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
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



### 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
10.0	10
11.0	11
12.5	12
16.0	16 or 1C
20.0	20
25.0	25
35.0	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
TDC	TDC

**330**

Rated cap.  
2 to 4 figures

Rated cap.	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
1000	1000
1500	1500

**M**

Cap. tolerance  
1 figure

Cap. tolerance	Code
±20%	M

**L**

Special code  
0 to 4 figures



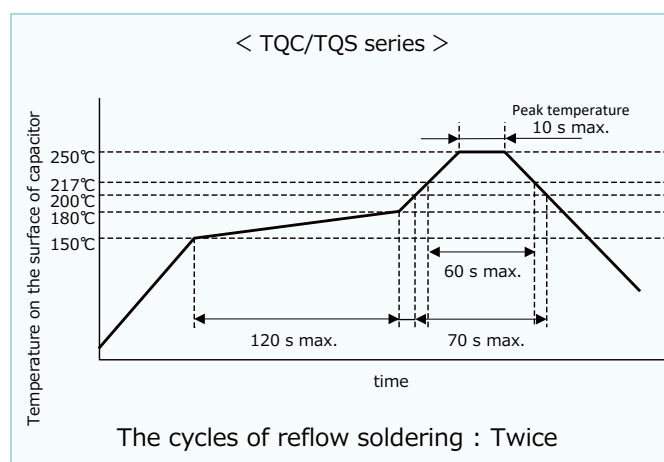
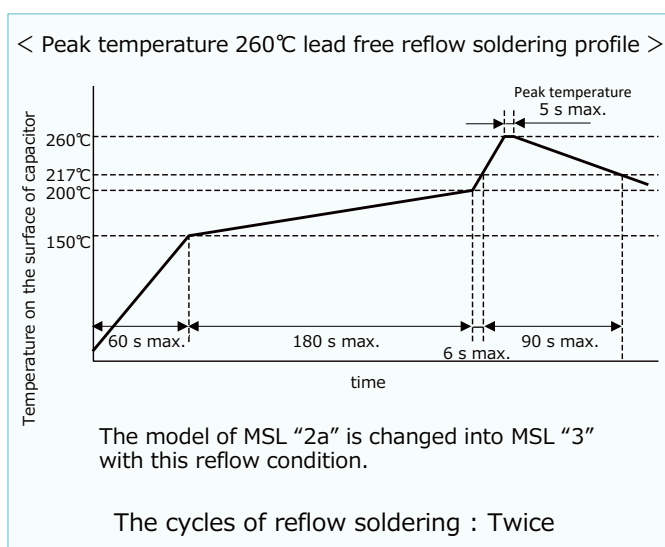
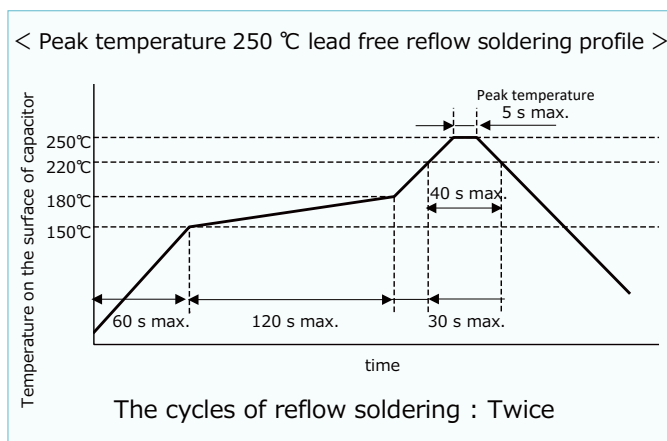
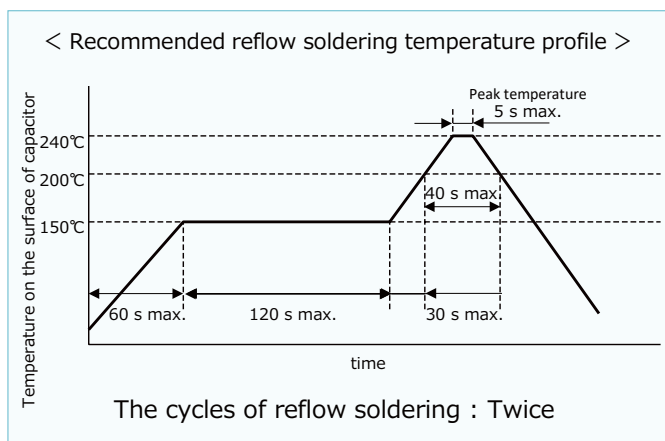
S09/B09 (TPU), A09/A14 (TPH)  
is not a recommended product.

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

Standard		Code
TPF series		
D3L	ESR 9 mΩ max.	9L
	ESR 7 mΩ max.	7L
	ESR 6 mΩ max.	6L
	ESR 5 mΩ max.	5L
D4	ESR 10 mΩ max.	AH
	ESR 6 mΩ max.	6H
	ESR 5 mΩ max.	5H
TPU series		
S09		SI
B09		BI
TQC / TDC series		
Capacitance enlarged type		YF
Capacitance enlarged type (B2 size)		YFB
Capacitance enlarged type (D12 size)		YFS
Capacitance enlarged type (D15 size)		YFT
Capacitance enlarged type (D2 size)		YFD/D3
TPU series		
	ESR 70 mΩ max.	BD
	ESR 100 mΩ max.	ED
	ESR 150 mΩ max.	HD
All series		
	ESR 55 mΩ max.	G
	ESR 45 mΩ max.	V
	ESR 40 mΩ max.	W
	ESR 35 mΩ max.	Z
	ESR 18 mΩ max.	I
	ESR 15 mΩ max.	F
	ESR 12 mΩ max.	C
	ESR 9 mΩ max.	9
	ESR 7 mΩ max.	7
	ESR 6 mΩ max.	6
	ESR 5 mΩ max.	5
	ESR 35 mΩ / 300kHz max.	ZG
	ESR 30 mΩ / 300kHz max.	UG
	ESR 9 mΩ / 300kHz max.	9G
	ESR 6 mΩ / 500kHz max.	6E
	ESR 4 mΩ / 500kHz max.	4E

## Mounting specifications

### ◇ Recommendable reflow soldering



### ● Soldering with a soldering iron

Tip of a soldering iron

: 350 °C max (TQC/TQS series : 400 °C max.)

Power of a soldering iron

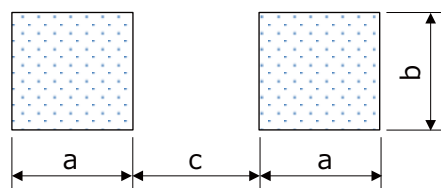
: 30 W max.

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

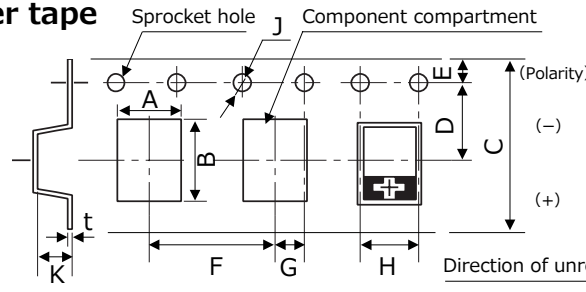
Size code	a	b	c
S09	1.0	0.9	0.6
A09, A14	1.6	1.4	1.0
B09, B1, B1S, B1G, B15G, B2, B2S	1.6	2.7	1.4
D12, D15, D15E, D2E, D2, D3L, D4	2.4	2.9	3.7



S09/B09 (TPU), A09/A14 (TPH) is not a recommended product.

### Packing specifications

#### ◇ Dimension of carrier tape

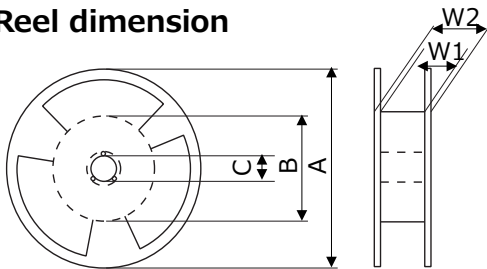


**!** S09/B09 (TPU), A09/A14 (TPH) is not a recommended product.

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 dimension



A	B	C	W1	W2
φ330±2	φ80±2	φ13.0±0.2	13.5±0.5	17.5±1.0
φ180 $+0$ $-3$	φ60±2	φ13.0±0.2	9.0±0.5	11.4±1.0

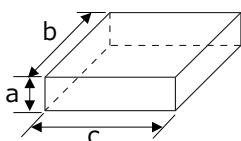
#### ◇ Minimum packing quantity and weight

Size code	Qty. (pcs./Reel)	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	Qty. (pcs./Reel)	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, ITPF and TQC series.  
Please contact our sales representative if you prefer it.

#### ◇ Dimension of packing case



Reel size	Unit (mm)	
	φ180	φ330
a	90	120
b	240	360
c	240	360

#### ◇ Units per packing case

Size code	Pieces/case	Size code	Pieces/case
S09, A09	15000	D12	22500
A14	12500	D15	15000
B09, B1	15000	D15E	20000
B1S, B1G	12500	D2E, D2	15000
B15G	12500	D3L	12500
B2, B2S	10000	D4	10000

## Surface Mount Type

TPG series



**POSCAP**

### Features

- Small size, Low profile (L 3.5 × W 2.8 × H 1.1 mm)
- Large capacitance (220 μF max.)
- RoHS compliance, Halogen free

### Specifications

Size code	B1G	B15G
Category temp. range	-55 °C to +105 °C	
Rated volt. range	2.5 V.DC to 12.5 V.DC	2.5 V.DC to 6.3 V.DC
Category volt. range	2.0 V.DC to 10 V.DC	2.0 V.DC to 5.0 V.DC
Rated cap. 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
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit
	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
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit
	Leakage current	≤ 3 times of the initial limit

### Marking

Polarity marking(+) Rated Capacitance code

Rated Voltage code Lot. No.

R. voltage code		Unit : V.DC	
e	2.5	j	6.3
g	4.0	k	8.0
		A	10
		B	12.5

R. capacitance code		Unit : μF	
N7	33	A8	100
S7	47	E8	150
		J8	220

### Dimensions (not to scale)

Size code	L <sup>+0.3/-0.1</sup>	W <sup>+0.3/-0.1</sup>	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

Unit : mm

\* Externals of figure are the reference.

### Characteristics list

Rated volt. (V.DC)	Rated temp. (°C)	Category volt. (V.DC)	Category temp. (°C)	Rated cap. (μF)	Case size (mm)			Size code	Specifications				Standard		Floor life level	
					L	W	H		Ripple current <sup>*1</sup> (mA r.m.s.)	ESR <sup>*2</sup> (mΩ max.)	tan δ <sup>*3</sup>	LC <sup>*4</sup> (μA)	Part number	Min. packaging q'ty (pcs)	Reflow temp ≤260°C	Reflow temp ≤250°C
2.5	85	2.0	105	220	3.5	2.8	1.1	B1G	1000	70	0.10	55	2R5TPG220M	2500	3	3
	85	2.0	105		3.5	2.8	1.4	B15G	1400	30/300 kHz	0.10	110	2R5TPG220MUG	2500		
4.0	85	3.2	105	220	3.5	2.8	1.4	B15G	1000	70	0.10	88	4TPG220M	2500		
	85	5.0	105		3.5	2.8	1.1	B1G	1000	70	0.10	63	6TPG100M	2500		
6.3	85	5.0	105	100	3.5	2.8	1.1	B1G	1100	55	0.10	63	6TPG100MG	2500		
	85	5.0	105		3.5	2.8	1.1	B1G	1200	35/300 kHz	0.10	126	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	B15G	1200	35/300 kHz	0.10	189	6TPG150MZG	2500		
8.0	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	B1G	1000	70	0.10	47	10TPG47M	2500		
12.5	85	10	105	33	3.5	2.8	1.1	B1G	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 catalog for "Reflow conditions", "Taping specifications" and "Floor life level".



## Surface Mount Type TPSF series



**POSCAP**

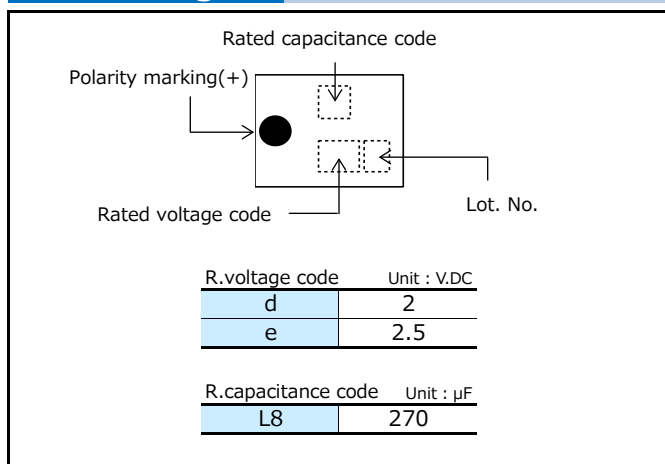
### Features

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

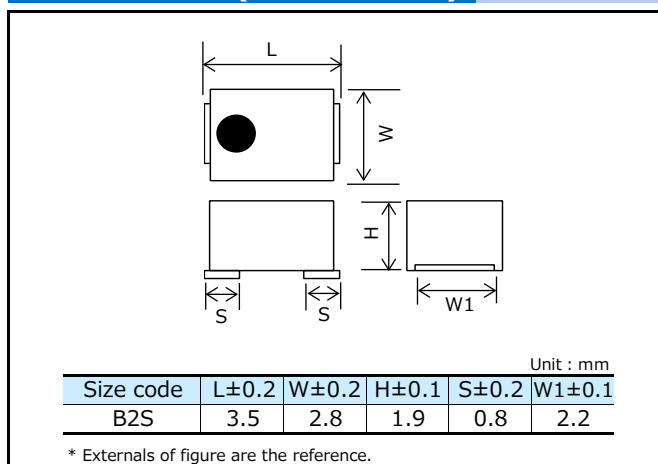
### Specifications

Size code	B2S	
Category temp. range	-55 °C to +105 °C	
Rated volt. range	2.0 V.DC to 2.5 V.DC	
Category volt. range	2.0 V.DC to 2.5 V.DC	
Rated cap. 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
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit
	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
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit
	Leakage current	≤ 3 times of the initial limit

### Marking



### Dimensions (not to scale)



### Characteristics list

Rated volt. (V.DC)	Rated temp. (°C)	Cate- gory volt. (V.DC)	Cate- gory temp. (°C)	Rated cap. (μF)	Case size (mm)			Size code	Specifications				Standard		Floor life level	
					L	W	H		Ripple current (mA r.m.s.)	ESR*2 (mΩ max.)	tan δ*3	LC*4 (μA)	Part number	Min. packaging q'ty (pcs)	Reflow temp ≤260°C	Reflow temp ≤250°C
2.0	105	2.0	105	270	3.5	2.8	1.9	B2S	3200	6/500 kHz	0.08	108.0	2TPSF270M6E	2000	5	5
									2400	9/300 kHz	0.08	108.0	2TPSF270M9G	2000	3	3
2.5	105	2.5	105		3.5	2.8	1.9		3200	6/500 kHz	0.08	135.0	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 catalog for "Reflow conditions", "Taping specifications" and "Floor life level".

## Surface Mount Type

TPE series B size

POSCAP



### Features

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

### Specifications

Size code	B2	
Category temp. range	-55 °C to +105 °C	
Rated volt. range	2.0 V.DC to 10 V.DC	
Category volt. range	1.8 V.DC to 8 V.DC	
Rated cap. 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
	Dissipation factor(tan δ)	≤ 1.5 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 (2R5TPE220MAZB (MAPB, MAFB), 2R5TPE330MAZB, 2TPE330MAFB (MADGB), 2TPE470MAJGB (MAFB), 2TPE330MFB, ETPE330MAFB (MA9GB))
		Within +40 %, -20 % of the initial value (Except for above model)
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit
	Leakage current	≤ 3 times of the initial limit

### Marking

Rated capacitance code

Polarity marking(+)

Rated voltage code

Lot No.

R. voltage code		Unit : V.DC	
d	2.0	g	4.0
e	2.5	j	6.3
		k	8.0
		A	10

R. capacitance code		Unit : μF	
S7	47	E8	150
A8	100	J8	220
C8	120	N8	330
		S8	470

### 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

Rated volt. (V.DC)	Rated temp. (°C)	Category volt. (V.DC)	Category temp. (°C)	Rated cap. (μF)	Case size (mm)			Size code	Specifications				Standard		Floor life level	
					L	W	H		Ripple current <sup>*1</sup> (mA r.m.s.)	ESR <sup>*2</sup> (mΩ max.)	tan δ <sup>*3</sup>	LC <sup>*4</sup> (μA)	Part number	Min. packaging qty (pcs)	Reflow temp ≤260°C	Reflow temp ≤250°C
2.0	105	2.0	105	330	3.5	2.8	1.9	B2	2000	15	0.08	132.0	2TPE330MFB	2000	3	3
	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	13/300kHz	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	11/300kHz	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	15/300kHz	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		
	85	2.0	105		3.5	2.8	1.9		3200	9/300kHz	0.08	165.0	ETPE330MA9GB	2000		
	105	2.5	105		3.5	2.8	1.9		3200	9/300kHz	0.08	165.0	ETPE330M9GB	2000		
	85	2.0	105		3.5	2.8	1.9		2700	15	0.08	165.0	ETPE330MAFB	2000		
4.0	105	4.0	105	100	3.5	2.8	1.9	2700	15	0.08	165.0	ETPE330MFB	2000			
	85	3.2	105		150	3.5	2.8	1.9	1400	35	0.08	40.0	4TPE100MZB	2000		
	85	3.2	105		220	3.5	2.8	1.9	1400	35	0.08	60.0	4TPE150MAZB	2000		
6.3	105	6.3	105	100	3.5	2.8	1.9	1400	35	0.08	88.0	4TPE220MAZB	2000			
	85	5.0	105		3.5	2.8	1.9	1600	25	0.08	63.0	6TPE100MPB	2000			
	105	6.3	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	63.0	6TPE100MZB	2000			
	85	5.0	105		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			
85	5.0	105	3.5		2.8	1.9	1600	25	0.10	138.6	6TPE220MAPB	2000				
8.0	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 catalog for "Reflow conditions", "Taping specifications" and "Floor life level".

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

## Surface Mount Type

TPE series D size



**POSCAP**

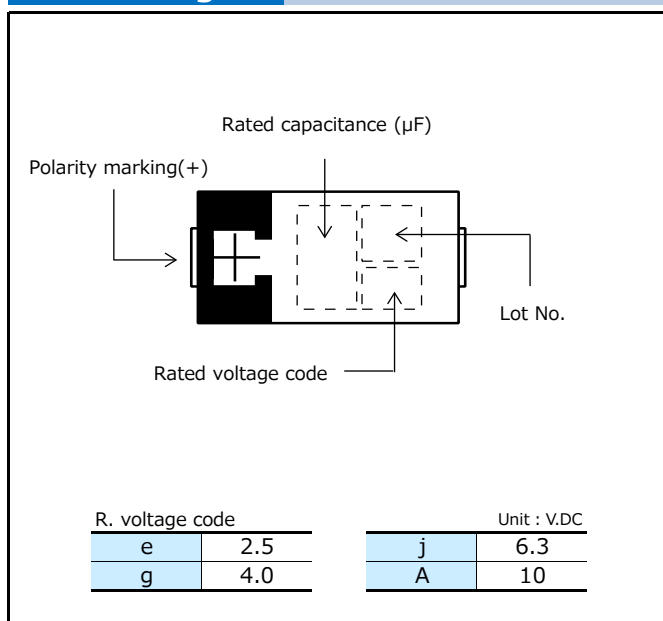
### Features

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

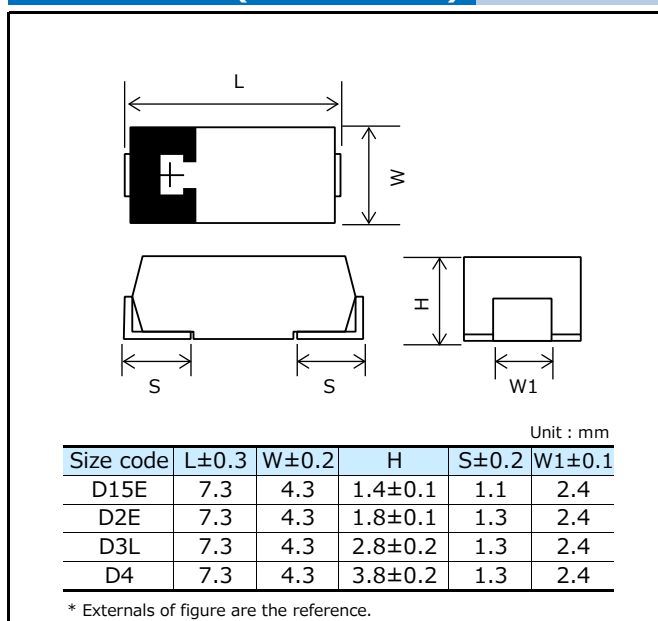
### Specifications

Size code	D15E	D2E	D3L	D4
Category temp. range	-55 °C to +105 °C			
Rated volt. range	6.3 V.DC	2.5 V.DC to 10 V.DC		
Category volt. range	5.0 V.DC	2.5 V.DC to 10 V.DC		
Rated cap. 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, rated voltage applied			
	Capacitance change	Within ±20 % of the initial value		
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))		
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit		
	Leakage current	≤ 3 times of the initial limit		

### Marking



### Dimensions (not to scale)



## Characteristics list

Rated volt. (V.DC)	Rated temp. (°C)	Category volt. (V.DC)	Category temp. (°C)	Rated cap. (μF)	Case size (mm)			Size code	Specifications				Standard		Floor life level		
					L	W	H		Ripple* <sup>1</sup> current (mA r.m.s.)	ESR* <sup>2</sup> (mΩ max.)	tan δ* <sup>3</sup>	LC* <sup>4</sup> (μA)	Part number	Min. packaging qty (pcs)	Reflow temp ≤260°C	Reflow temp ≤250°C	
2.5	105	2.5	105	220	7.3	4.3	1.8	D2E	3900	9	0.10	55.0	2R5TPE220M9	3000	3		
	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	470	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		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	680	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		7.3	4.3	2.8		D3L	3500	12	0.10	170.0	2R5TPE680MCL			2500
	105	2.5	105	1000	7.3	4.3	3.8		D3L	3100	15	0.10	170.0	2R5TPE680MFL			2500
	105	2.5	105		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		D4	4400	12	0.15	375.0	2R5TPE1500MC			2000
	105	2.5	105		7.3	4.3	3.8		D4	3900	15	0.15	375.0	2R5TPE1500MF			2000
4.0	105	4.0	105	150	7.3	4.3	1.8	D2E	2800	18	0.10	60.0	4TPE150MI	3000	2a		
	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		D3L	3100	15	0.10	188.0	4TPE470MFL			2500
	105	4.0	105		7.3	4.3	2.8		D3L	2800	18	0.10	188.0	4TPE470MIL			2500
	105	4.0	105		7.3	4.3	2.8		D3L	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	3		
	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		7.3	4.3	1.8		2800	18	0.10	138.6	6TPE220MI	3000			
	105	6.3	105	220	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		D3L	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		D3L	3900	9/500kHz	0.10	207.9	6TPE330MA9EL			2500
	105	6.3	105		7.3	4.3	2.8		D3L	3100	15	0.10	207.9	6TPE330MFL			2500
	105	6.3	105		7.3	4.3	2.8		D3L	2800	18	0.10	207.9	6TPE330MIL			2500
	105	6.3	105		7.3	4.3	2.8		D3L	2400	25	0.10	207.9	6TPE330ML			2500
	85	5.0	105	470	7.3	4.3	3.8		D4	4400	10	0.10	207.9	6TPE330MAA			2000
	85	5.0	105		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	D4	3000	25	0.15	296.1	6TPE470M	2000				
105	6.3	105	680	7.3	4.3	3.8	D4	3500	18	0.15	428.4	6TPE680MI	2000				
105	6.3	105		7.3	4.3	3.8	D4	3000	25	0.15	428.4	6TPE680M	2000				
10	105	10	105	68	7.3	4.3	1.8	D2E	2400	25	0.10	68.0	10TPE68M	3000	-		
	105	10	105	220	7.3	4.3	2.8	D3L	2800	18	0.10	220.0	10TPE220MIL	2500			
	105	10	105		7.3	4.3	2.8	D3L	2400	25	0.10	220.0	10TPE220ML	2500			
	105	10	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 catalog for "Reflow conditions", "Taping specifications" and "Floor life level".

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



## Surface Mount Type

### TPF series



# POSCAP

### Features

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

### Specifications

Size code	D2E	D3L	D4
Category temp. range	-55 °C to +105 °C		
Rated volt. range	2.0 V.DC	2.5 V.DC to 10 V.DC	2.5 V.DC to 6.3 V.DC
Category volt. range	2.0 V.DC	2.5 V.DC to 10 V.DC	2.5 V.DC to 6.3 V.DC
Rated cap. 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	
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit	
	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))	
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit	
	Leakage current	≤ 3 times of the initial limit	

### Marking

Rated capacitance (μF)

Polarity marking(+)

Rated voltage code

Lot No.

R. voltage code		Unit : V.DC	
d	2.0	g	4.0
e	2.5	j	6.3

Unit : V.DC	
A	10

### Dimensions (not to scale)

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

\* Externals of figure are the reference.

### Characteristics list

Rated volt. (V.DC)	Rated temp. (°C)	Category volt. (V.DC)	Category temp. (°C)	Rated cap. (μF)	Case size (mm)			Size code	Specifications				Standard		Floor life level	
					L	W	H		Ripple current* <sup>1</sup> (mA r.m.s.)	ESR* <sup>2</sup> (mΩ max.)	tan δ* <sup>3</sup>	LC* <sup>4</sup> (μA)	Part number	Min. packaging q'ty (pcs)	Reflow temp ≤260°C	Reflow temp ≤250°C
2.0	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	470	7.3	4.3	2.8	D3L	4400	7	0.10	82.5	2R5TPF330M7L	2500	3	2a
	105	2.5	105		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	1000	7.3	4.3	3.8	D4	6100	5	0.10	170.0	ETPF680M5H	2000		
	105	2.5	105		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			
4.0	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	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 catalog for "Reflow conditions", "Taping specifications" and "Floor life level".

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

## Surface Mount Type TQS series



**POSCAP**

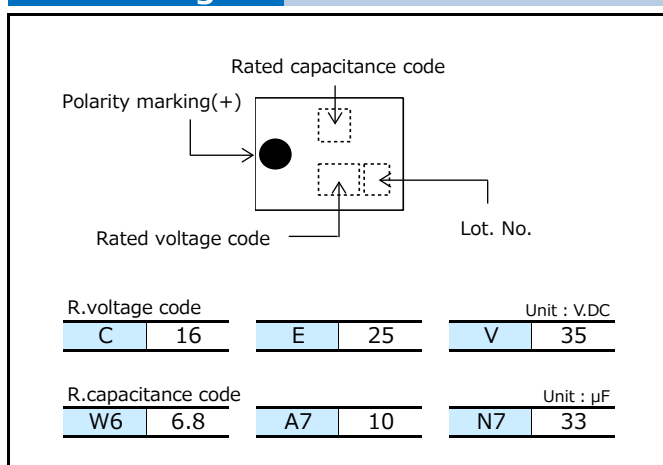
### Features

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

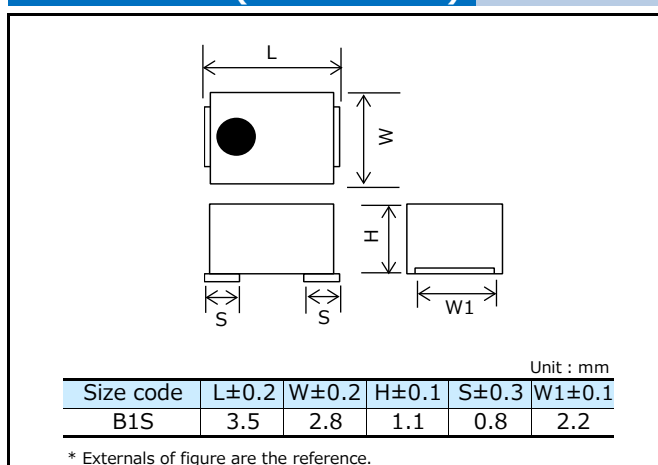
### Specifications

Size code	B1S	
Category temp. range	-55 °C to +105 °C	
Rated volt. range	16 V.DC to 35 V.DC	
Category volt. range	16 V.DC to 35 V.DC	
Rated cap. 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
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit
	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
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit
	Leakage current	≤ 3 times of the initial limit

### Marking



### Dimensions (not to scale)



### Characteristics list

Rated volt. (V.DC)	Rated temp. (°C)	Category volt. (V.DC)	Category temp. (°C)	Rated cap. (μF)	Case size (mm)			Size code	Specifications				Standard		Floor life level	
					L	W	H		Ripple current <sup>*1</sup> (mA r.m.s.)	ESR <sup>*2</sup> (mΩ max.)	tan δ <sup>*3</sup>	LC <sup>*4</sup> (μA)	Part number	Min. packaging q'ty (pcs)	Reflow temp ≤260°C	Reflow temp ≤250°C
16	105	16	105	33	3.5	2.8	1.1	B1S	1500	70	0.10	52.8	16TQS33MBD	2500	-	3
25	105	25	105	10	3.5	2.8	1.1		1000	100	0.10	25.0	25TQS10MED	2500		
35	105	35	105	6.8	3.5	2.8	1.1		900	150	0.10	23.8	35TQS6R8MHD	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 catalog for "Reflow conditions", "Taping specifications" and "Floor life level".

## Surface Mount Type TQC series B size



**POSCAP**

### Features

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

### Specifications

Size code	B2	
Category temp. range	-55 °C to +105 °C	
Rated volt. range	16 V.DC to 35 V.DC	
Category volt. range	16 V.DC to 35 V.DC	
Rated cap. 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
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit
	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
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit
	Leakage current	≤ 3 times of the initial limit

### Marking

Rated voltage code

C	16	E	25
D	20	V	35

Unit : V.DC

Rated capacitance code

L6	2.7	Y6	8.2	J7	22
Q6	3.9	A7	10	N7	33
U6	5.6	E7	15		

Unit : μF

### Dimensions (not to scale)

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

Unit : mm

\* Externals of figure are the reference.

### Characteristics list

Rated volt. (V.DC)	Rated temp. (°C)	Category volt. (V.DC)	Category temp. (°C)	Rated cap. (μF)	Case size (mm)			Size code	Specifications				Standard		Floor life level	
					L	W	H		Ripple <sup>*1</sup> current (mA r.m.s.)	ESR <sup>*2</sup> (mΩ max.)	tan δ <sup>*3</sup>	LC <sup>*4</sup> (μA)	Part number	Min. packaging q'ty (pcs)	Reflow temp. ≈260°C	Reflow temp. ≈250°C
16	105	16	105	10	3.5	2.8	1.9	B2	800	100	0.10	48.0	16TQC10M	2000	-	3
	105	16	105	15	3.5	2.8	1.9		1000	90	0.10	72.0	16TQC15M	2000		
	105	16	105	22	3.5	2.8	1.9		1000	90	0.10	35.2	16TQC22MYFB	2000		
	105	16	105	33	3.5	2.8	1.9		1000	90	0.10	158.4	16TQC33MYFB	2000		
20	105	20	105	8.2	3.5	2.8	1.9		800	100	0.10	49.2	20TQC8R2M	2000		
	105	20	105	22	3.5	2.8	1.9		1100	90	0.10	132.0	20TQC22MYFB	2000		
	105	25	105	5.6	3.5	2.8	1.9		800	100	0.10	42.0	25TQC5R6M	2000		
25	105	25	105	15	3.5	2.8	1.9		900	100	0.10	112.5	25TQC15MYFB	2000		
	105	35	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 catalog for "Reflow conditions", "Taping specifications" and "Floor life level".  
 ◆ Small order quantity (500 pcs/reel) is available with TQC series. Please contact our sales representative if you prefer it.

### Surface Mount Type TQC series D size



# POSCAP

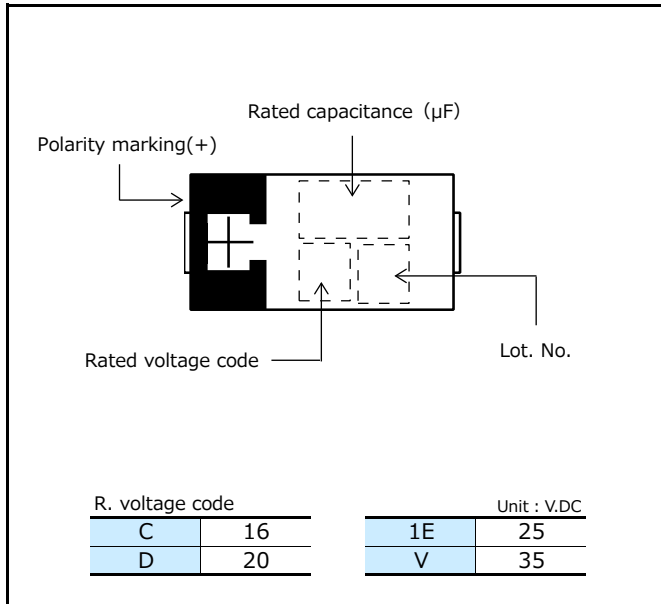
### Features

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

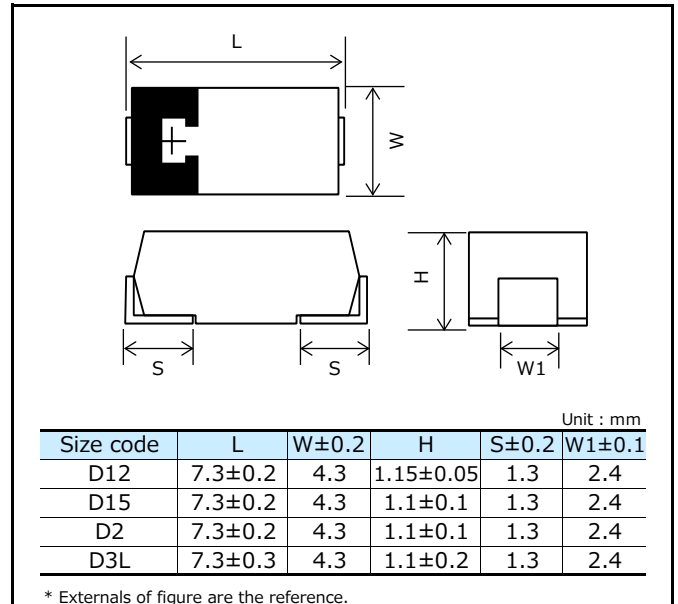
### Specifications

Size code	D12	D15	D2	D3L
Category temp. range	-55 °C to +105 °C			
Rated volt. 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 volt. 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 cap. range	33 μF	22 μF to 47 μF	10 μF to 150 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 1000 h rated voltage applied			
	Capacitance change	Within ±20 % of the initial value		
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit		
	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		
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit		
	Leakage current	≤ 3 times of the initial limit		

### Marking



### Dimensions (not to scale)





### Characteristics list

Rated volt. (V.DC)	Rated temp. (°C)	Category volt. (V.DC)	Category temp. (°C)	Rated cap. (μF)	Case size (mm)			Size code	Specifications				Standard		Floor life level	
					L	W	H		Ripple current* <sup>1</sup> (mA r.m.s.)	ESR* <sup>2</sup> (mΩ max.)	tan δ* <sup>3</sup>	LC* <sup>4</sup> (μA)	Part number	Min. packaging q'ty (pcs)	Reflow temp ≤260°C	Reflow temp ≤250°C
16	105	16	105	33	7.3	4.3	##	D12	1800	40	0.10	52.8	16TQC33MYFS	4500	-	3
	105	16	105		7.3	4.3	1.9	D2	1400	70	0.10	52.8	16TQC33MYFD	3000		
	105	16	105	47	7.3	4.3	1.4	D15	1500	55	0.10	75.2	16TQC47MYFT	3000		
	105	16	105		7.3	4.3	1.9	D2	1800	40	0.10	75.2	16TQC47MW	3000		
	105	16	105		7.3	4.3	1.9		1450	55	0.10	75.2	16TQC47MYFD	3000		
	105	16	105		68	7.3	4.3		1.9	1500	50	0.10	108.8	16TQC68MYF		
	105	16	105	100	7.3	4.3	1.9		1800	50	0.10	160.0	16TQC100MYF	3000		
	105	16	105	150	7.3	4.3	2.8	D3L	1800	50	0.10	240.0	16TQC150MYF	2500		
	105	16	105	150	7.3	4.3	1.9		1500	70	0.15	240.0	1CTQC15173F1	3000		
20	105	20	105	33	7.3	4.3	1.9	D2	1400	60	0.10	66.0	20TQC33MYFD	3000		
	105	20	105	47	7.3	4.3	1.9		1450	55	0.10	94.0	20TQC47MYF	3000		
	105	20	105		7.3	4.3	1.4	D15	1500	55	0.10	94.0	20TQC47MYFT	3000		
	105	20	105	100	7.3	4.3	1.9	D2	1250	100	0.15	200.0	20TQC100MD2	3000		
	105	20	105		7.3	4.3	2.8	D3L	1700	55	0.10	200.0	20TQC100MYF	2500		
25	105	25	105	15	7.3	4.3	1.9	D2	1500	45	0.10	38.0	25TQC15MV	3000		
	105	25	105		7.3	4.3	1.9		1000	90	0.10	38.0	25TQC15MYFD	3000		
	105	25	105	7.3	4.3	1.9	1500		45	0.10	55.0	25TQC22MV	3000			
	105	25	105	22	7.3	4.3	1.9		1400	60	0.10	55.0	25TQC22MYFD	3000		
	105	25	105		7.3	4.3	1.4	D15	1400	70	0.10	55.0	25TQC22MYFT	3000		
	105	25	105	33	7.3	4.3	1.9	D2	1400	60	0.10	82.5	25TQC33MYF	3000		
	105	25	105	68	7.3	4.3	2.8	D3L	1400	70	0.10	170.0	25TQC68MYF	2500		
35	105	35	105	10	7.3	4.3	1.9	D2	1000	120	0.10	35.0	35TQC10M	3000		
	105	35	105		7.3	4.3	1.9		1000	120	0.10	35.0	35TQC10MYF	3000		
	105	35	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 catalog for "Reflow conditions", "Taping specifications" and "Floor life level".

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

## Surface Mount Type

### TA series



**POSCAP**

■ This product is not intended for use in any driving application or any other critical functions that affect passenger safety.(e.g. Powertrain, ABS, Engine ECU, Airbag, etc.)  
If the intended use of TA/TV series products is for use in other automotive related applications, please contact our sales team. All requests are subject to approval.

### Features

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

### Specifications

Size code	B2	D2E	D3L
Category temp. range	-55 °C to +105 °C		
Rated volt. range	4.0 V.DC to 10 V.DC	2.5 V.DC to 10 V.DC	
Category volt. range	4.0 V.DC to 10 V.DC	2.5 V.DC to 10 V.DC	
Rated cap. range	47 µF 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	
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit	
	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 (I, F), 2R5TAE220M (F, 9)) Within +40 %, -20 % of the initial value (Except for above model)	
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit	
	Leakage current	Within the initial limit	

### Marking

< B2 size >

< D2E, D3L size >

e	2.5
g	4

j	6.3
A	10

< B2 size >

S7	47
W7	68

A8	100
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### Dimensions (not to scale)

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

Unit : mm

\* Externals of figure are the reference.

## Characteristics list

Rated volt. (V.DC)	Rated temp. (°C)	Category volt. (V.DC)	Category temp. (°C)	Rated cap. (μF)	Case size (mm)			Size code	Specifications				Standard		Floor life level		
					L	W	H		Ripple current* <sup>1</sup> (mA r.m.s.)	ESR* <sup>2</sup> (mΩ max.)	tan δ* <sup>3</sup>	LC* <sup>4</sup> (μA)	Part number	Min. packaging qty (pcs)	Reflow temp ≤260°C	Reflow temp ≤250°C	
2.5	105	2.5	105	220	7.3	4.3	1.8	D2E	3900	9	0.10	110.0	2R5TAE220M9	3000	3	3	
	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			
4.0	105	4.0	105	100	3.8	2.8	1.9	B2	1100	70	0.08	40.0	4TAB100M	2000	3	3	
	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	3	3	
	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	2400	25	0.10	94.5	6TAE150M	3000				
	105	6.3	105	220	7.3	4.3	1.8	D2E	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	105	47	3.5	2.8	1.9	B2	1100	70	0.08	47.0	10TAB47M	2000	3	3	
	105	10	105	68	7.3	4.3	1.8	D2E	2400	25	0.10	68.0	10TAE68M	3000			
	105	10	105	150	7.3	4.3	2.8	2400	25	0.10	150.0	10TAE150ML	2500				
	105	10	105	220	7.3	4.3	2.8	D3L	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 catalog for "Reflow conditions", "Taping specifications" and "Floor life level".

## Surface Mount Type TV series



**POSCAP**

■ This product is not intended for use in any driving application or any other critical functions that affect passenger safety.(e.g. Powertrain, ABS, Engine ECU, Airbag, etc.)  
If the intended use of TA/TV series products is for use in other automotive related applications, please contact our sales team. All requests are subject to approval.

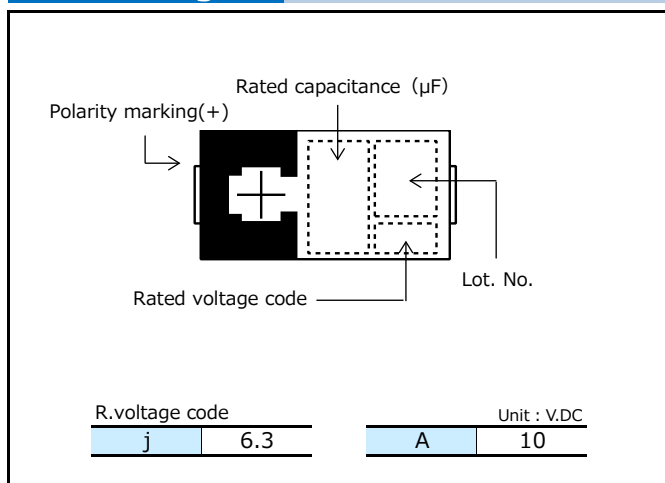
### Features

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

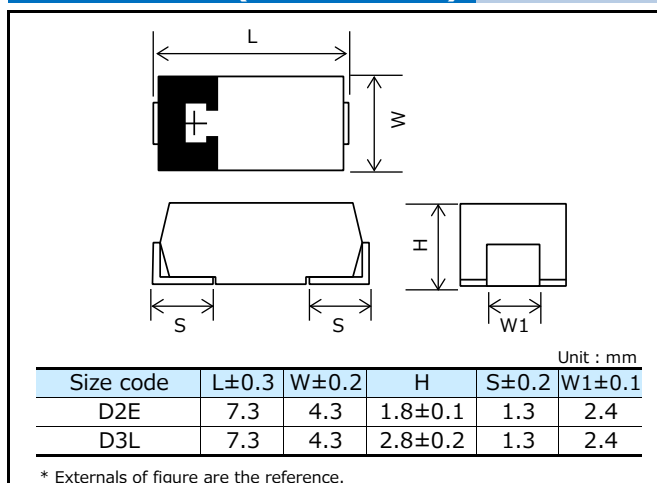
### Specifications

Size code	D2E	D3L
Category temp. range	-55 °C to +125 °C	
Rated volt. range	6.3 V.DC to 10 V.DC	10 V.DC
Category volt. range	4.0 V.DC to 6.3 V.DC	6.3 V.DC
Rated cap. 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)	
	Temperature	125 °C
	Capacitance change	Within ±20% of the initial value
	Dissipation factor(tan δ)	≤ 2 times of the initial limit
	Leakage current	≤ 2 times of the initial limit
Damp heat (Steady State)	+85 °C, 85 % to 90 %, 500 h, rated voltage applied	
	Capacitance change	Within +40 %, -20 % of the initial value
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit
	Leakage current	Within the initial limit

### Marking



### Dimensions (not to scale)



### Characteristics list

Rated volt. (V.DC)	Rated temp. (°C)	Category volt. (V.DC)	Category temp. (°C)	Rated cap. (μF)	Case size (mm)			Size code	Specifications				Standard		Floor life level	
					L	W	H		Ripple current <sup>*1</sup> (mA r.m.s.)	ESR <sup>*2</sup> (mΩ max.)	tan δ <sup>*3</sup>	LC <sup>*4</sup> (μA)	Part number	Min. packaging q'ty (pcs)	Reflow temp ≤260°C	Reflow temp ≤250°C
6.3	105	4.0	125	150	7.3	4.3	1.8	D2E	2400	25	0.10	94.5	6TVE150M	3000	5	3
10	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 catalog for "Reflow conditions", "Taping specifications" and "Floor life level".

## Surface Mount Type TH series



**POSCAP**

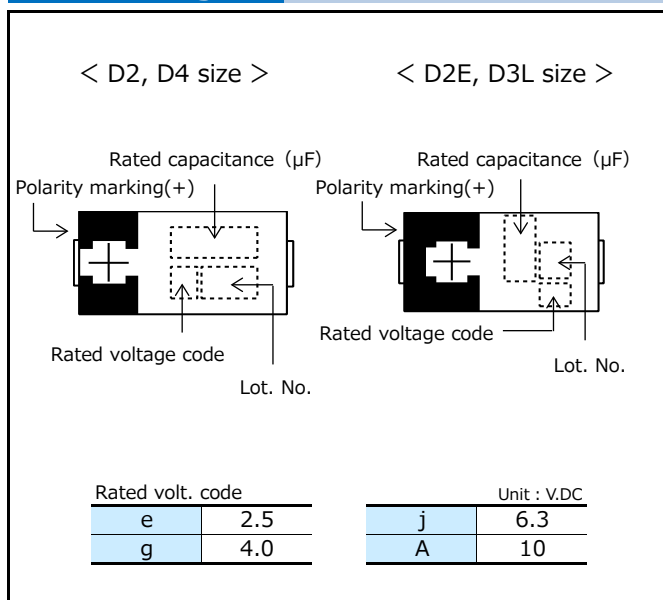
### Features

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

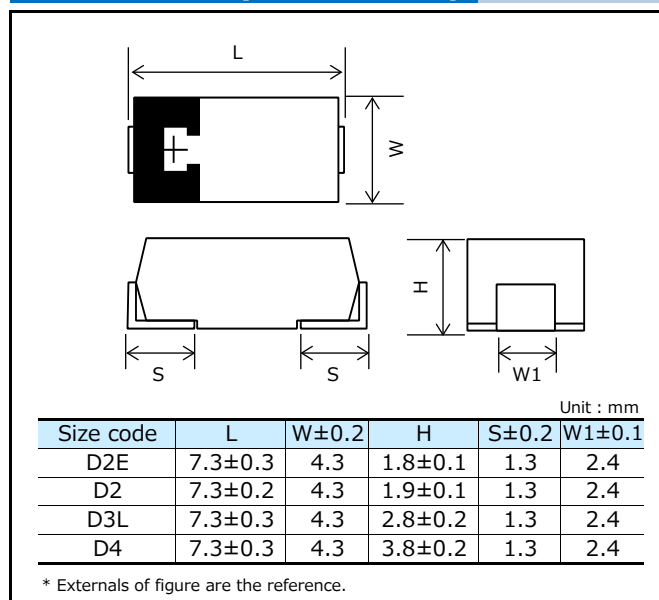
### Specifications

Size code	D2E	D2	D3L	D4
Category temp. range	-55 °C to +125 °C			
Rated volt. range	2.5 V.DC to 6.3 V.DC	2.5 V.DC to 10 V.DC	4.0 V.DC to 6.3 V.DC	6.3 V.DC to 10 V.DC
Category volt. 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 cap. 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 1000 h, category voltage applied			
	Capacitance change	Within ±20 % of the initial value		
	Dissipation factor(tan δ)	≤ 2 times of the initial limit		
	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		
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit		
	Leakage current	≤ 3 times of the initial limit		

### Marking



### Dimensions (not to scale)





### Characteristics list

Series	Rated volt. (V.DC)	Rated temp. (°C)	Category volt. (V.DC)	Category temp. (°C)	Rated cap. (μF)	Case size (mm)			Size code	Specifications				Standard		Floor life level	
						L	W	H		Ripple* <sup>1</sup> current (mA r.m.s.)	ESR* <sup>2</sup> (mΩ max.)	tan δ* <sup>3</sup>	LC* <sup>4</sup> (μA)	Part number	Min. packaging q'ty (pcs)	Reflow temp ≤260°C	Reflow temp ≤250°C
THB	4.0	105	2.5	125	330	7.3	4.3	2.8	D3L	2000	40	0.10	132.0	4THB330ML	2500	-	5
										2000	40	0.10	138.6	6THB220ML	2500		
	6.3	105	4.0	125	220	7.3	4.3	2.8	D3L	3000	40	0.10	207.9	6THB330M	2000		
										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		
										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		
										1900	40	0.10	94.5	6THC150M	3000		
										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		
										2800	18	0.10	82.5	2R5THE330MI	3000		
										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		
										2800	18	0.10	88.0	4THE220MI	3000		
										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		
										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 catalog for "Reflow conditions", "Taping specifications" and "Floor life level".

## Surface Mount Type TPB series



**POSCAP**

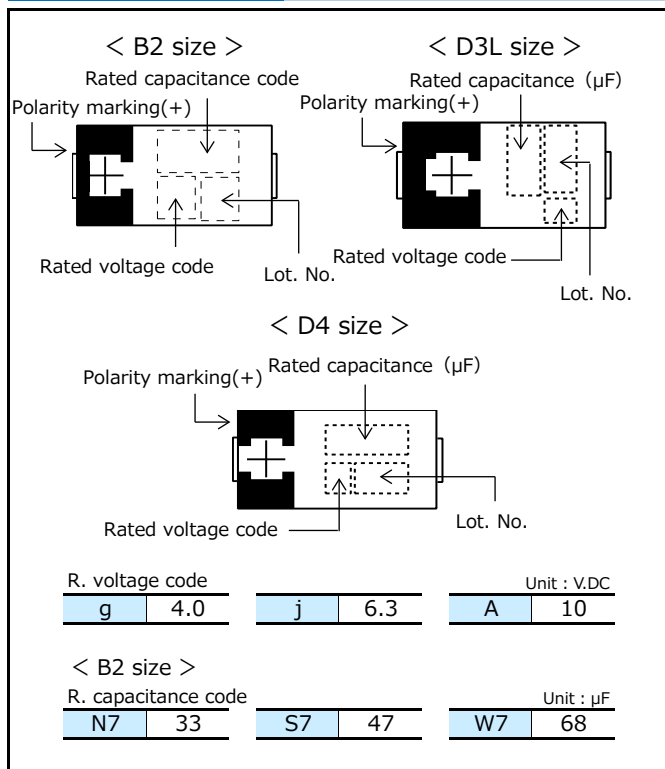
### Features

- Standard
- RoHS compliance, Halogen free

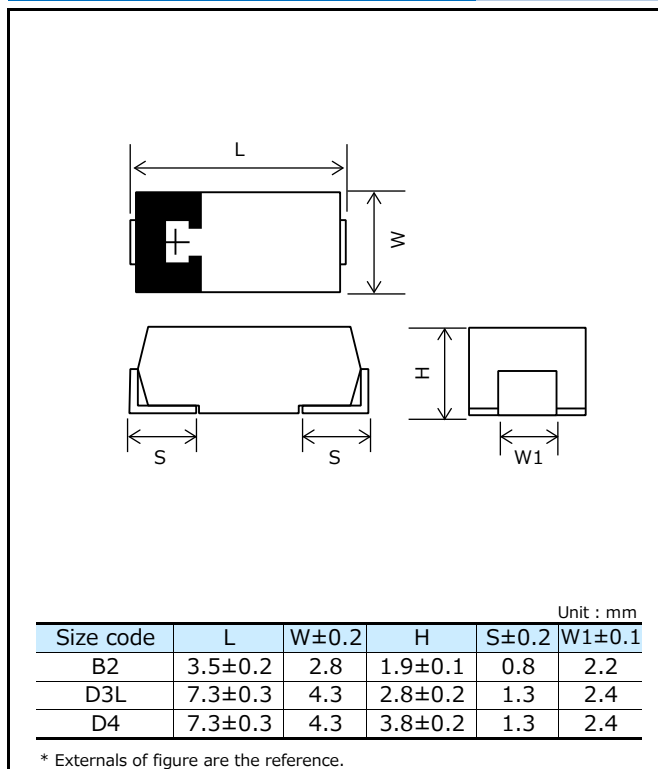
### Specifications

Size code	B2	D3L	D4
Category temp. range	-55 °C to +105 °C		
Rated volt. range	4.0 V.DC to 10 V.DC		6.3 V.DC to 10 V.DC
Category volt. range	4.0 V.DC to 10 V.DC		6.3 V.DC to 10 V.DC
Rated cap. 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 2000 h, (B2 size : 1000 h) rated voltage applied		
	Rated temp. +85 °C 1000 h rated voltage applied		
	Capacitance change	Within ±20 % of the initial value	
	Dissipation factor(tan δ)	≤ 1.5 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 (Except for above model)	
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit	
	Leakage current	≤ 3 times of the initial limit	

### Marking



### Dimensions (not to scale)



### Characteristics list

Rated volt. (V.DC)	Rated temp. (°C)	Category volt. (V.DC)	Category temp. (°C)	Rated cap. (μF)	Case size (mm)			Size code	Specifications				Standard		Floor life level	
					L	W	H		Ripple current* <sup>1</sup> (mA r.m.s.)	ESR* <sup>2</sup> (mΩ max.)	tan δ* <sup>3</sup>	LC* <sup>4</sup> (μA)	Part number	Min. packaging qty (pcs)	Reflow temp ≤260°C	Reflow temp ≤250°C
4.0	105	4.0	105	68	3.5	2.8	1.9	B2	1100	70	0.08	27.2	4TPB68M	2000		3
	105	4.0	105	330	7.3	4.3	2.8	D3L	2000	40	0.10	132	4TPB330ML	2500		2a
6.3	105	6.3	105	33	3.5	2.8	1.9	B2	1100	70	0.08	20.7	6TPB33M	2000	3	3
	105	6.3	105	68	3.5	2.8	1.9		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		2a
	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	470	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	105	33	3.5	2.8	1.9	B2	1100	70	0.08	33.0	10TPB33M	2000		3
	105	10	105	47	3.5	2.8	1.9		1100	70	0.08	47.0	10TPB47M	2000		
	105	10	105	150	7.3	4.3	2.8	D3L	2000	40	0.10	150.0	10TPB150ML	2500		2a
	105	10	105	220	7.3	4.3	2.8		2000	40	0.10	220.0	10TPB220ML	2500		
	105	10	105		7.3	4.3	3.8	3000	40	0.10	220.0	10TPB220M	2000	3		
	105	10	105	330	7.3	4.3	3.8	D4	3000	35	0.10	330.0	10TPB330M	2000		-
105	10	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 catalog for "Reflow conditions", "Taping specifications" and "Floor life level".

## Surface Mount Type TC series



**POSCAP**

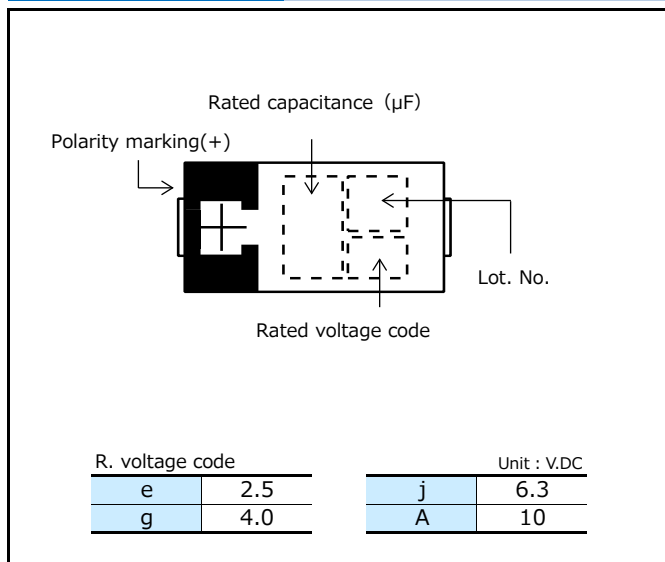
### Features

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

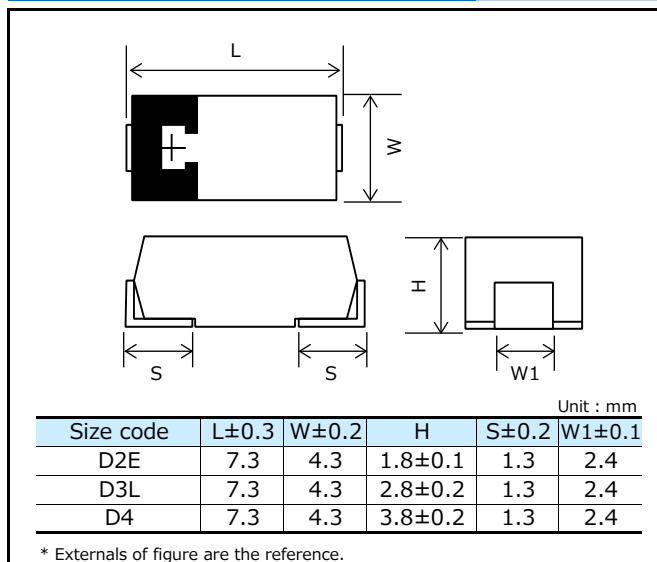
### Specifications

Size code	D2E	D3L	D4
Category temp. range	-55 °C to +125 °C		
Rated volt. range	4.0 V.DC to 6.3 V.DC	2.5 V.DC to 10 V.DC	
Category volt. range	3.2 V.DC to 5.0 V.DC	2.0 V.DC to 8.0 V.DC	
Rated cap. 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 voltage applied		
	Capacitance change	Within ±20 % of the initial value	
	Dissipation factor(tan δ)	≤ 2 times of the initial limit	
	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))	
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit	
	Leakage current	≤ 3 times of the initial limit	

### Marking



### Dimensions (not to scale)



## Characteristics list

Series	Rated volt. (V.DC)	Rated temp. (°C)	Category volt. (V.DC)	Category temp. (°C)	Rated cap. (μF)	Case size (mm)			Size code	Specifications				Standard		Floor life level					
						L	W	H		Ripple* <sup>1</sup> current (mA r.m.s.)	ESR* <sup>2</sup> (mΩ max.)	tan δ* <sup>3</sup>	LC* <sup>4</sup> (μA)	Part number	Min. packaging q'ty (pcs)	Reflow temp ≤260°C	Reflow temp ≤250°C				
TCE	2.5	105	2.0	125	680	7.3	4.3	2.8	D3L	3500	12	0.10	170.0	ETCE680MCL	2500	3					
		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		
	4.0	105	3.2	125	150	7.3	4.3	1.8	D2E	2800	18	0.10	60.0	4TCE150MI	3000						
						7.3	4.3	1.8		3100	15	0.10	88.0	4TCE220MF	3000						
			220	7.3		4.3	1.8	2800		18	0.10	88.0	4TCE220MI	3000							
				7.3		4.3	1.8	2400		25	0.10	88.0	4TCE220M	3000							
		330	105	3.2	125	470	7.3	4.3	1.8	D3L	2800	18	0.10	132.0	4TCE330MI			3000			
							7.3	4.3	1.8		2400	25	0.10	132.0	4TCE330M			3000			
			105	3.2	125		7.3	4.3	2.8		3500	12	0.10	188.0	4TCE470MCL			2500			
							7.3	4.3	2.8		3100	15	0.10	188.0	4TCE470MFL			2500			
		6.3	105	5.0	125	100	7.3	4.3	1.8	D2E	2800	18	0.10	63.0	6TCE100MI			3000			
							7.3	4.3	1.8		2400	25	0.10	63.0	6TCE100M			3000			
							7.3	4.3	1.8		3100	15	0.10	94.5	6TCE150MF			3000			
				150	7.3		4.3	1.8	2800		18	0.10	94.5	6TCE150MI	3000						
	7.3				4.3		1.8	2400	25		0.15	94.5	6TCE150M	3000							
	7.3				4.3		1.8	2800	18		0.15	138.6	6TCE220MI	3000							
	220		105	5.0	125	470	7.3	4.3	1.8	D3L	2400	25	0.15	138.6	6TCE220M			3000			
							7.3	4.3	1.8		3100	15	0.10	207.9	6TCE330MFL			2500			
							7.3	4.3	2.8		2800	18	0.10	207.9	6TCE330MIL			2500			
			330	7.3	4.3		2.8	2400	25		0.10	207.9	6TCE330ML	2500							
				105	5.0		125	680	7.3		4.3	3.8	D4	3500	18			0.15	296.1	6TCE470MI	2000
									7.3		4.3	3.8		3000	25			0.15	296.1	6TCE470M	2000
	7.3		4.3	3.8	3500	18	0.15		428.4	6TCE680MI	2000										
	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	
							7.3		4.3	2.8		2400		25	0.10			220.0	10TCE220ML	2500	
							7.3	4.3	3.8	3000		25	0.10	330.0	10TCE330M			2000			
			330	7.3	4.3		2.8	4400	6	0.10		170.0	ETCF680M6L	2500							
		7.3		4.3	2.8		4400	7	0.10	170.0		ETCF680M7L	2500								
7.3		4.3		2.8	4400		10	0.10	170.0	ETCF680ML		2500									
TCF	2.5	105	2.0	125	680	7.3	4.3	2.8	D3L	6100	5	0.10	170.0	ETCF680M5H	2000						
						7.3	4.3	3.8		6100	5	0.10	250.0	ETCF1000M5H	2000						
						7.3	4.3	3.8		5600	6	0.10	250.0	ETCF1000M6H	2000						
		1000	7.3	4.3		3.8	4000	12		0.10	132.0	4TCF330ML	2500								
			7.3	4.3		2.8	4400	10		0.10	188.0	4TCF470ML	2500								
			7.3	4.3		3.8	4400	10		0.10	272.0	4TCF680MAH	2000								
	4.0	105	3.2	125	330	7.3	4.3	2.8	D3L	6100	5	0.10	138.6	6TCF220M5L	2500						
						7.3	4.3	2.8		4600	9	0.10	138.6	6TCF220M9L	2500						
						7.3	4.3	2.8		4000	12	0.10	138.6	6TCF220ML	2500						
		470	7.3	4.3		2.8	3900	9		0.10	207.9	6TCF330M9L	2500								
			7.3	4.3		3.8	4400	10		0.10	296.1	6TCF470MAH	2000								
			7.3	4.3		3.8	3600	15		0.10	150.0	10TCF150ML	2500								
	6.3	105	5.0	125	220	7.3	4.3	2.8	D3L	6100	5	0.10	138.6	6TCF220M5L	2500						
						7.3	4.3	2.8		4600	9	0.10	138.6	6TCF220M9L	2500						
						7.3	4.3	2.8		4000	12	0.10	138.6	6TCF220ML	2500						
		330	7.3	4.3		2.8	3900	9		0.10	207.9	6TCF330M9L	2500								
			7.3	4.3		3.8	4400	10		0.10	296.1	6TCF470MAH	2000								
			7.3	4.3		3.8	3600	15		0.10	150.0	10TCF150ML	2500								
10	105	8.0	125	150	7.3	4.3	2.8	D3L	6100	5	0.10	138.6	6TCF220M5L	2500							
					7.3	4.3	2.8		4600	9	0.10	138.6	6TCF220M9L	2500							
					7.3	4.3	2.8		4000	12	0.10	138.6	6TCF220ML	2500							
	330	7.3	4.3		2.8	3900	9		0.10	207.9	6TCF330M9L	2500									
		7.3	4.3		3.8	4400	10		0.10	296.1	6TCF470MAH	2000									
		7.3	4.3		3.8	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 catalog for "Reflow conditions", "Taping specifications" and "Floor life level".

## Surface Mount Type

TDC series

**NEW**



**POSCAP**

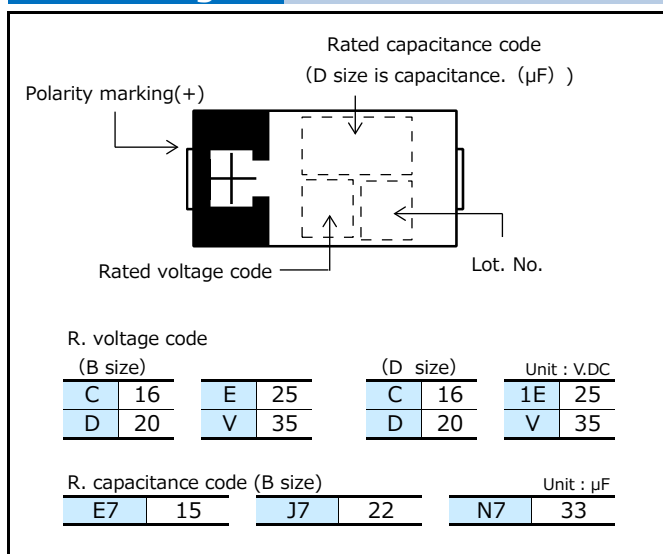
### Features

- 125 °C 1000 h
- High voltage (25 V.DC max.)
- RoHS compliance, Halogen free

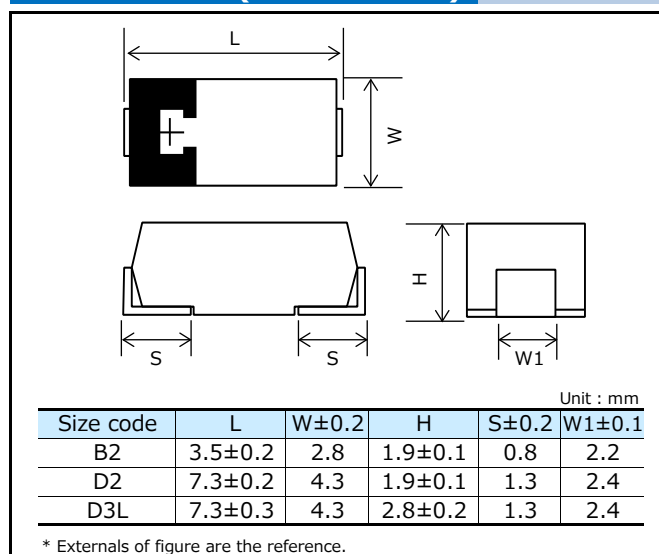
### Specifications

Size code	B2	D2	D3L
Category temp. range	-55 °C to +125 °C		
Rated volt. range	16 V.DC to 25 V.DC	16 V.DC	16 V.DC to 25 V.DC
Category volt. range	12.8 V.DC to 20 V.DC	12.8 V.DC	12.8 V.DC to 20 V.DC
Rated cap. range	15 μF to 33 μF	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	+125 °C 1000 h, category voltage applied		
	Capacitance change	Within ±20 % of the initial value	
	Dissipation factor(tan δ)	≤ 2 times of the initial limit	
	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	
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit	
	Leakage current	≤ 3 times of the initial limit	

### Marking



### Dimensions (not to scale)



### Characteristics list

Rated volt. (V.DC)	Rated temp. (°C)	Category volt. (V.DC)	Category temp. (°C)	Rated cap. (μF)	Case size (mm)			Size code	Specifications				Standard		Floor life level	
					L	W	H		Ripple current*1 (mA r.m.s.)	ESR*2 (mΩ max.)	tan δ*3	LC*4 (μA)	Part number	Min. packaging q'ty (pcs)	Reflow temp ≤260°C	Reflow temp ≤250°C
16	105	12.8	125	33	3.5	2.8	1.9	B2	1000	90	0.10	158.4	16TDC33MYFB	2000	-	3
	105	12.8	125	100	7.3	4.3	1.9	D2	1800	50	0.10	160.0	16TDC100MYF	3000		
	105	12.8	125	150	7.3	4.3	2.8	D3L	1800	50	0.10	240.0	16TDC150MYF	2500		
20	105	16	125	22	3.5	2.8	1.9	B2	1000	90	0.10	132.0	20TDC22MYFB	2000		
	105	16	125	100	7.3	4.3	2.8	D3L	1700	55	0.10	200.0	20TDC100MYF	2500		
25	105	20	125	15	3.5	2.8	1.9	B2	900	100	0.10	112.5	25TDC15MYFB	2000		
	105	20	125	68	7.3	4.3	2.8	D3L	1400	70	0.10	170.0	25TDC68MYF	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 catalog for "Reflow conditions", "Taping specifications" and "Floor life level".



## Surface Mount Type TPC series



**POSCAP**

### Features

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

### Specifications

Size code	B1	D2
Category temp. range	-55 °C to +105 °C	
Rated volt. range	6.3 V.DC to 12.5 V.DC	6.3 V.DC to 10 V.DC
Category volt. range	5.0 V.DC to 10 V.DC	6.3 V.DC to 10 V.DC
Rated cap. 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 2000 h (B1 size : 1000 h) , rated voltage applied	
	Rated temp. +85 °C 1000 h rated voltage applied	
	Capacitance change	Within ±20 % of the initial value
	Dissipation factor(tan δ)	≤ 1.5 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
	Dissipation factor(tan δ)	≤ 1.5 times of the initial limit
	Leakage current	≤ 3 times of the initial limit

### Marking

< B1 size >

Rated capacitance code

Polarity marking(+)

Rated voltage code

Lot No.

< D2 size >

Rated capacitance (µF)

Polarity marking(+)

Rated voltage code

Lot No.

R. voltage code	
j	6.3
k	8.0

Unit : V.DC	
A	10
B	12.5

< B1 size >	
R. capacitance code	
A7	10
E7	15

Unit : µF	
J7	22
N7	33

Unit : µF	
S7	47

### Dimensions (not to scale)

Size code	Unit : mm				
	L±0.2	W±0.2	H±0.1	S±0.2	W1±0.1
B1	3.5	4.3	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

Rated volt. (V.DC)	Rated temp. (°C)	Category volt. (V.DC)	Category temp. (°C)	Rated cap. (μF)	Case size (mm)			Size code	Specifications				Standard		Floor life level	
					L	W	H		Ripple current <sup>*1</sup> (mA r.m.s.)	ESR <sup>*2</sup> (mΩ max.)	tan δ <sup>*3</sup>	LC <sup>*4</sup> (μA)	Part number	Min. packaging qty (pcs)	Reflow temp ≤260°C	Reflow temp ≤250°C
6.3	85	5.0	105	47	3.5	2.8	1.1	B1	1100	55	0.10	29.6	6TPC47M	3000	3	3
	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		1900	40	0.10	94.5	6TPC150M	3000		
	85	5.0	105	330	7.3	4.3	1.9		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	3	3
	105	8.0	105	150	7.3	4.3	1.9	D2	1900	40	0.10	120.0	8TPC150M	3000		
10	105	10	105	68	7.3	4.3	1.9		1700	45	0.10	68.0	10TPC68M	3000	2a	
	105	10	105	100	7.3	4.3	1.9		1700	45	0.10	100.0	10TPC100M	3000		
12.5	85	10	105	10	3.5	2.8	1.1	B1	800	80	0.10	12.5	12TPC10M	3000	3	
	85	10	105	15	3.5	2.8	1.1		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 catalog for "Reflow conditions", "Taping specifications" and "Floor life level".

## Surface Mount Type

## POSCAP

Series : TPU

 This series is not a recommended product.  
Not recommended for new design.



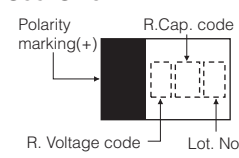
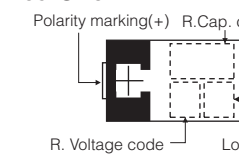
### Features

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

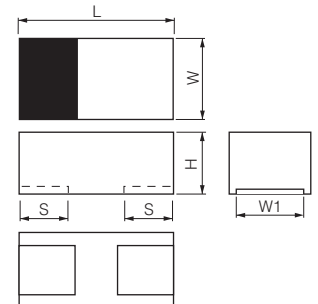
### Specifications

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 code	R. Voltage code		
R. Voltage (V.DC)	R.Cap. code		
Code	Lot. No.		
2.5	e	4.0	g
6.3	j	10.0	A
S09 Size			
R. Cap. (μF)	4.7	10	22
Code	s	A	J
			S
			W
			A
B09 Size			
R. Cap. (μF)	150		
Code	E8		

### Dimensions (not to scale)



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

Unit : mm

\*1 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)			Size code	Specifications				Standard		Floor life	
						L	W	H		Ripple current*1 (mA r.m.s.)	ESR*2 (mΩ max.)	tan δ*3	LC*4 (μA)	Part number	Min. Packaging Qty (pcs)	Reflow Temp ≤260°C	Reflow Temp ≤250°C
TPU	2.5	85	2.5	85	47	2.0	1.25	0.9	S09	510	150	0.10	23.5	2R5TPU47MSI	3000	-	3
		85	2.5	85	100	2.0	1.25	0.9		510	150	0.10	50.0	ETPU100MSI	3000		
	85	4.0	85	68	2.0	1.25	0.9	510		150	0.10	54.4	4TPU68MSI	3000			
	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			
	6.3	85	6.3	85	150	3.5	2.8	0.9	B09	670	100	0.10	94.5	6TPU150MBI	3000	3	
		85	6.3	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 catalog for "Reflow conditions" and "Taping specifications".

## Surface Mount Type

# POSCAP



Series : **TPH**

**⚠** This series is not a recommended product.  
Not recommended for new design.

### 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
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)			Size code	Specifications				Standard		Floor life	
						L	W	H		Ripple current (mA r.m.s.) <sup>*1</sup>	ESR (mΩ max.) <sup>*2</sup>	tan δ <sup>*3</sup>	LC (μA) <sup>*4</sup>	Part number	Min. Packaging Qty (pcs)	Reflow Temp ≤260°C	Reflow Temp ≤250°C
TPH	2.5	105	2.5	105	100	3.2	1.6	0.9	A09	510	150	0.10	25.0	ETPH100MHA	3000	3	3
		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		
	10	85	6.3	85	100	3.2	1.6	1.4	A14	740	70	0.10	126.0	6TPH100MABC	2500		
		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 catalog for "Reflow conditions" and "Taping specifications".

# Catalog 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	Series	Size code	Models for deletion	Year of deletion	Alternative model	
TPB	B2	2R5TPB100M	2012	4TPE100MZB	TPG	B1G	10TPG33M	2011	12TPG33M	
		2R5TPB220MA	2009	2R5TPE220MZB	TPSF	B2S	11TPSF62MAIG	2012	–	
		4TPB100M	2009	4TPE100MZB	TPH	A09	ETPH100MHA	2018	–	
		8TPB47M	2009	10TPB47M			4TPH68MHA	2018	–	
		6TPB47M	2009	6TPE47MB			6TPH47MHA	2018	–	
		6TPB100MA	2009	6TPE100MAZB			6TPH100MAEA	2018	–	
	6TPB100MAV	2009	6TPE100MAZB	ATPH33MAHA			2018	–		
	2R5TPB330ML	2009	2R5TPE330M	ETPH220MABC			2018	–		
	D3L	4TPB220ML	2009	4TPE220M	A14	ETPH220MAZC	2013	–		
		4TPB470ML	2009	4TPE470ML		4TPH150MABC	2018	–		
		6TPB150ML	2009	6TPC150M		6TPH100MABC	2018	–		
		10TPB100ML	2010	10TPC100M		2R5TPU22MSI	2011	–		
	D3	4TPB220M	2008	4TPE220M	TPU	S09	2R5TPU47MSI	2018	–	
		6TPB150M	2008	6TPC150M			ETPU100MSI	2018	–	
		10TPB100M	2008	10TPC100M			4TPU68MSI	2018	–	
		2R5TPB680M	2009	2R5TPE680MFL			6TPU10MSI	2018	–	
	D4	2R5TPB1000M	2009	2R5TPE1000MF			6TPU22MSI	2018	–	
		4TPB470M	2009	4TPE470ML			6TPU47MSI	2018	–	
4TPB680M		2009	6TPE680MI	10TPU4R7MSI			2018	–		
TPC	B1	2R5TPC56M	2012	6TPB68M			A09	2R5TPU100MAI	2011	–
		4TPC47M	2012	6TPC47MB				4TPU68MAI	2011	–
		6TPC33M	2012	6TPC47MB				6TPU47MAI	2011	–
		10TPC33MB	2013	12TPG33M	10TPU33MAI	2011		–		
	D2	2R5TPC330M	2009	2R5TPE330M	B09	6TPU150MBI		2018	–	
		4TPC150M	2009	4TPE150MI	TH	D2	4THC220M	2013	4THE220M	
4TPC220M	2009	4TPE220M	D3L	2R5THB330ML		2010	–			
TPE	B2	2TPE330MIB	2011	2TPE330MFB		D4	10THB100ML	2010	–	
		2TPE330MAFGB	2011	2TPE330MAFB	4THB680M		2013	–		
		2R5TPE150MZB	2011	2R5TPE220MZB	TQC		C	16TQC22M	2011	20TQC22MYFD
		2R5TPE220MIB	2012	2R5TPE220MFGB		20TQC15M		2011	25TQC15MYFD	
	4TPE150MUB	2013	4TPE150MAZB	25TQC10M		2011		25TQC15MYFD		
	D2E	2R5TPE220MC	2012	2R5TPE220M9		D2	16TQC33M	2012	16TQC33MYFD	
		2R5TPE220M7	2012	2R5TPE330M7			16TQC47M	2012	16TQC47MYFD	
		2R5TPE470M	2011	2R5TPE470MI			16TQC68MY	2012	16TQC68MYF	
		4TPE150M	2011	4TPE150MI			20TQC22M	2012	25TQC22MYFD	
	D3L	2R5TPE680ML	2012	2R5TPE680MFL			20TQC22MYFD	2015	25TQC22MYFD	
		2R5TPE680MIL	2011	2R5TPE680MFL			20TQC47MY	2012	20TQC47MYF	
	D4	2R5TPE1000M	2011	2R5TPE1000MF			25TQC15M	2012	25TQC15MYFD	
2R5TPE1000MI		2012	2R5TPE1000MF	25TQC22M			2012	25TQC22MYFD		
4TPE680M		2011	6TPE680MI	D3L			16TQC68M	2012	16TQC68MYF	
4TPE680MI		2012	6TPE680MI		20TQC47M		2012	20TQC47MYF		
4TPE680MF		2012	4TPF680MAH		25TQC33M		2012	25TQC33MYF		
D3	16TQC100M	2012	16TQC100MYF							

# 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	Series	Size code	Models for deletion	Year of deletion	Alternative model
TPA	C	6TPA47M	2012/9	10TPB47M	TPE	B2	2R5TPE220MPB	2012/9	2R5TPE220MLB
		10TPA33M	2012/9	10TPB33M			2R5TPE220MDGB	2013	2R5TPE220MFGB
	D3	4TPA220M	2012/9	4TPE220M		2R5TPE330MFC2	2012/9	2R5TPE330MF	
		6TPA150M	2012/9	6TPC150M		2R5TPE330MIC2	2012/9	2R5TPE330MF	
		10TPA100M	2012/9	10TPC100M		2R5TPE330MCC2	2012/9	2R5TPE330MC	
TPB	B2	4TPB100MV	2012/9	4TPE100MZB		2R5TPE330M9C2	2012/9	2R5TPE330M9	
		4TPB150MA	2012/9	4TPE150MAZB		4TPE220MFC2	2012/9	4TPE220MF	
		8TPB33M	2012/9	10TPB33M		4TPE220MIC2	2012/9	4TPE220MI	
	C	2R5TPB220MC	2012/9	4TPE220MI		4TPE220MPC2	2012/9	4TPE220MI	
		4TPB150MC	2012/9	6TPE150M		6TPE150MIC2	2012/9	6TPE150MI	
		4TPB220MC	2012/9	4TPE220MI		6TPE150MPC2	2012/9	6TPE150M	
		6TPB100MC	2012/9	6TPG100MG		8TPE100MPC2	2012/9	10TPPF150ML	
		6TPB150MC	2012/9	6TPE150M		2R5TPE330MFC	2012/9	2R5TPE330MF	
		8TPB82MC	2012/9	8TPE100MAZB		2R5TPE330MIC	2012/9	2R5TPE330MF	
		10TPB47MC	2012/9	10TPC68M		2R5TPE330MPC	2012/9	2R5TPE330MF	
		10TPB68MC	2012/9	10TPC68M	4TPE220MIC	2012/9	4TPE220MI		
		10TPB220MC	2009/10	–	4TPE220MPC	2012/9	4TPE220MI		
		2R5TPB470ML	2012/9	2R5TPE470MI	6TPE150MPC	2012/9	6TPE150M		
	D3L	2R5TPB680ML	2012/9	2R5TPE680MFL	6TPE220MIC	2012/9	6TPE220MI		
16TPB47ML		2003/6	16TQC47MYFD	6TPE220MPC	2012/9	6TPE220M			
2R5TPB330M		2012/9	2R5TPE330M	10TPE150MGC	2012/9	10TPE220ML			
D3	16TPB47M	2003/6	16TQC47MYFD	10TPE180MGC	2012/9	10TPE220ML			
	TPC	C1	2R5TPC82M	2012/9	–	D2E	2TPE330M6	2011	2TPF330M6
4TPC56M			2012/9	–	2TPE330M7		2011	2R5TPE330M7	
4TPC100M			2012/9	6TPG100MG	2TPE330M9		2011	2R5TPE330M9	
6TPC68M			2012/9	6TPG100MG	2TPE470M6		2011	2R5TPF470M6L	
6TPC100MC			2012/9	6TPG100MG	2TPE470M7		2011	2R5TPE470M7	
8TPC33M		2012/9	12TPG33M	2TPE470M9	2011		2R5TPE470M9		
D2	2R5TPC220M	2012/9	2R5TPE220M	2TPF470M6	2012/9	2R5TPF470M6L			
	16TPC33M	2003/6	16TQC33MYFD	D3L	4TPF470M5EL	2014	–		
TPD	D4D	2R5TPD470M	2007/10		2R5TPF470ML	TPG	B1G	4TPG150M	2012/9
		2R5TPD470M5	2012/3	ETPF470M5H	6TPG68MG			2012/9	6TPG100M
		2R5TPD470M6	2012/3	2R5TPF470M6L	B15G	6TPG220MZG	2014	–	
		2R5TPD470M8	2007/10	2R5TPF470M7L		TPL	D2T	2R5TPL220MC	2012/9
		2R5TPD680M	2007/10	2R5TPF680ML	2R5TPL330M7			2011/7	–
		2R5TPD680M5	2012/3	ETPF680M5H	All models		2013	–	
		2R5TPD680M6	2012/3	2R5TPF680M6L	D12T		All models	2013	–
		2R5TPD680M8	2007/10	2R5TPF680M7L	D15T	All models	2013	–	
		2R5TPD1000M	2012/3	ETPF1000M6H		TPLF	D2T	2TPLF470M7	2012/9
		2R5TPD1000M8	2012/3	ETPF1000M6H	2TPLF560M6			2011/7	–
		2R5TPD1000M6	2012/3	ETPF1000M6H	All models	2013	–		
		2R5TPD1000M5	2012/3	ETPF1000M5H	TPSF	B2S	2TPSF270MC	2012/9	2TPSF270M9G
		4TPD330M	2007/10	4TPF330ML			2TPSF270M9	2012/9	2TPSF270M9G
		4TPD470M	2007/10	4TPF470ML	B1S	ETPSF200M9ED	2014	–	
		4TPD680M	2012/3	4TPF680MAH		D3L	2R5THB470ML	2012/9	6THB470M
		6TPD220M	2007/10	6TPF220ML	2R5THB680M		2012/9	–	
		6TPD330M	2007/10	6TPF330M9L	2R5THB1000M		2012/9	–	
		6TPD470M	2012/3	6TPF470MAH	D4D	2R5THD680M	2012/3	2R5TPF680M6L	
		10TPD150M	2007/10	10TPF150ML		4THD470M	2012/9	–	
	2R5TPU22M	2012/9	–	6THD330M		2012/3	6TPF330M9L		
TPU	S08	4TPU15M	2012/9	–	TR	TR series	–	TA series	
		6TPU10M	2012/9	–	APA	D2A	APA series	2006/4	–
		4TPU15MSI	2011	–	APB	D1	APB series	2006/4	–
	S09	4TPU33MSI	2011	–	APC	D2	APC series	2009/6	–
		2R5TPU47MSK	2012/9	–	APD	D1	APD series	2009/6	–
		2R5TPU68MSK	2013	–	TQC	B15	35TQC2R7MYF	2016	35TQS6R8MHHD
		4TPU33MSK	2012/9	–			–	–	–
		4TPU47MSK	2013	–	–	–	–	–	–
		6TPU22MSK	2012/9	–	–	–	–	–	–
	6TPU33MSK	2013	–	–	–	–	–	–	
	B09	4TPU68MBI	2012/9	–	–	–	–	–	–
		6TPU47MBI	2012/9	–	–	–	–	–	–
		8TPU33MBI	2012/9	–	–	–	–	–	–



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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.
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The information in this catalog is valid as of September 2019.