

4.0&3.0 mm Height MOLDED SMD, Low Profile, High CV



- Operating with wide temperature range -55~+105°C
- High capacitance, Low-profile at 4.0mm and 3.0mm
- Load life of 2000 hours
- Compatibility with digitalization and high frequencies of electrical equipment with superior noise absorption.
- RoHS & REACH compliant, Halogen-free

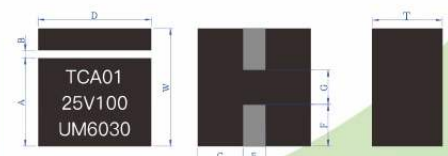
SPECIFICATIONS

Items	Characteristics		
Operation Temp. Range	-55 ~ +105° C		
Rated Voltage Range	6.3~ 35V		
Capacitance Range	4.00mm height: 56 ~ 330μF / 3.00mm height: 47 ~ 220μF		
Capacitance Tolerance	±20% at 120Hz, 20° C		
Leakage Current (*1)	≤Specified value (Rated voltage applied for 2 minutes at 20° C)		
Dissipation Factor (tan d)	0.12 max(at 20° C ,120Hz)		
ESR (*2)	≤Specified value at 100kHz, 20° C.		
Temperature Characteristics (Max. Imp. Ratio)	Measurement frequency: 100kHz		
	Impedance Ratio	Z(+105° C)/Z(20° C)	≤1.25
	ZT/Z20 (max.)	Z(-55° C)/Z(20° C)	≤1.25
Damp Heat (Steady State)	The following specifications shall be satisfied when the capacitors are restored to 20° C after exposing them for 500hours at 60° C, 90 to 95% RH without voltage applied.		
	Capacitance Change	Within ±20% of initial measured value (*3)	
	Dissipation Factor	150% or less of initial specified value	
	ESR (*2)	150% or less of initial specified value	
	Leakage Current	Initial specified value or less	
Endurance	After 2000 hours application of the rated voltage at 105° C, the characteristics meet the requirements listed below.		
	Capacitance Change	Within ±20% of initial measured value (*3)	
	Dissipation Factor	150% or less of initial specified value	
	ESR (*2)	150% or less of initial specified value	
	Leakage Current	Initial specified value or less	
Resistance to Soldering Heat	After reflow soldering and restored to room temperature, the characteristics meet the requirements listed below.		
	Capacitance Change	Within ±10% of initial measured value (*3)	
	Dissipation Factor	130% or less of initial specified value	
	ESR (*2)	130% or less of initial specified value	
	Leakage Current	Initial specified value or less	
Marking	Laser print on the case top.		

- (*1) If any doubt arises, measure the leakage current after the voltage treatment of applying DC rated voltage continuously to the capacitor for 120 minutes at 105°C.
- (*2) Should be measured at both of the terminal ends closest where the terminals protrude through the molded case.
- (*3) The cap. value before the test of resistance to soldering heat.

DRAWING (Unit: mm)

Dimensions	D	W	T	A	B	C	E	F	G
6.5x6.5x4.0	6.5±0.1	6.5±0.1	4.0 Max	4.88	0.40	2.60	1.30	2.30	1.90
6.5x6.5x3.0	6.5±0.1	6.5±0.1	3.0 Max	4.88	0.40	2.60	1.30	2.30	1.90
5.0x5.0x3.0	5.0±0.1	5.0±0.1	3.0 Max	3.38	0.40	1.85	1.30	1.75	1.50



DIMENSIONS & STANDARD RATINGS

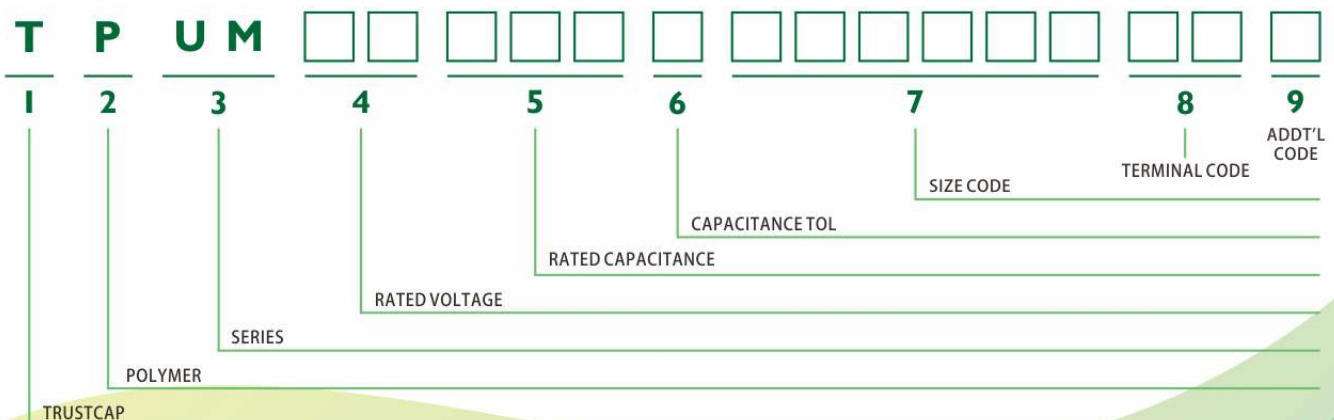
VDC	Rated Capacitance (μF)	Case size L x W x H (mm)	ESR	RC	LC	TrustCap Part number
			100 kHz	100 kHz	20°C	
			20°C (mΩ)	105°C (mA)	2 Minutes (μA)	
6.3	330	6.5 × 6.5 × 4.0	20	2400	415	TPUM0J331M656540TR
12	220	6.5 × 6.5 × 4.0	32	2100	528	TPUM1T221M656540TR
16	180	6.5 × 6.5 × 4.0	32	1900	576	TPUM1C181M656540TR
25	100	6.5 × 6.5 × 4.0	40	1900	500	TPUM1E101M656540TR
35	56	6.5 × 6.5 × 4.0	50	1100	392	TPUM1V560M656540TR
6.3	220	6.5 × 6.5 × 3.0	25	2000	277	TPUM0J221M656530TR
12	180	6.5 × 6.5 × 3.0	35	1600	432	TPUM1T181M656530TR
16	150	6.5 × 6.5 × 3.0	35	1400	480	TPUM1C151M656530TR
25	100	6.5 × 6.5 × 3.0	50	1100	500	TPUM1E101M656530TR
35	47	6.5 × 6.5 × 3.0	55	1000	329	TPUM1V470M656530TR
16	68	5.0 × 5.0 × 3.0	65	950	217	TPUM1C680M505030TR
25	47	5.0 × 5.0 × 3.0	65	950	235	TPUM1E470M505030TR

PART NUMBER SYSTEM

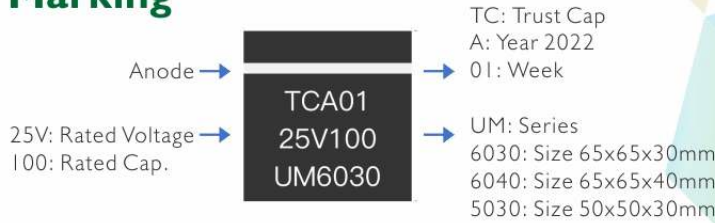
1	Company	TRUSTCAP
	Code	T
2	Type	Polymer Capacitor
	Code	P
3	Series	Code
	UM	UM
4	Voltage(W.V.)	Code
	6.3	0J
	10	1A
	12	1T
	16	1C
	25	1E
	30	1F
	35	1V
	50	1H

5	Cap. (μf)	Code
	47	470
	56	560
	68	680
	100	101
	150	151
6	Cap. Tol. (%)	Code
	±10	K
	±20	M
	-10~+30	Q
	-10~+50	T
	Special	A

7	Size Code (mm) L x W x H	Code
	6.5 x 6.5 x 4.0	656540
	6.5 x 6.5 x 3.0	656530
8	Terminal	Code
	Tape & Reel	TR



Marking



Test Method & Performance

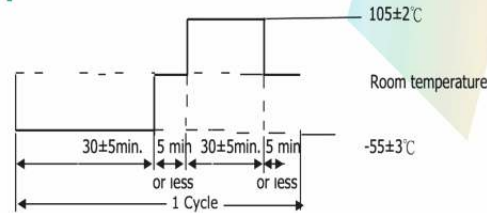
Test environmental conditions:

Ambient temperature: 20±2°C / Relative humidity : 60~70% / Air pressure : 86~106 kPa

No.	Item	Test condition			Specification			
1	Rated voltage				See specification table			
2	Capacitance (Tolerance)	Measuring frequency : 120Hz±20% Measuring voltage : 0.5Vrms max. +1.5 to 2.0 VDC Measurement circuit : Series Equivalent circuit			See specification table (M:±20%)			
3	Tan δ	Measuring frequency : 120Hz±20% Measuring voltage : 0.5Vrms max. +1.5 to 2.0 VDC Measurement circuit : Series Equivalent circuit			See specification table			
4	ESR	Measuring frequency : 100kHz±20% Measuring voltage : 0.5Vrms max. +1.5 to 2.0 VDC Measurement circuit : Series Equivalent circuit			See specification table			
5	Leakage Current	C=Rated capacitance(μF), V=Rated Voltage(VDC), Voltage applied for 2 minutes at 20°C			I=0.2CV (after 2 minutes) See characteristic table			
6	Surge voltage (Rated Voltage x 1.15(V))	The following specifications shall be satisfied when the capacitors are restored to +20°C after the surge voltage is applied at a cycle of 360 seconds which consists charge for 30±5 seconds and discharge for 330 seconds, for 1000 cycles at 105±2°C. Protective resistor and discharge resistor: 1 kΩ			No visible damage Leakage current ≤ specified value Capacitance change: within ±20% of initial value tan δ ≤ 150% of specified value ESR ≤ 150% of specified value			
7	Temperature characteristics	Step	Temperature(°C)	Measure items	Impedance ratio of the -25°C and -55°C values to the +20°C values shall be not exceed the values as below			
		1	+20 ±2	Impedance (at 100kHz±20%)				
		2	-25±3	Impedance (at 100kHz±20%)			Z _{-25°C} /Z _{+20°C}	1.15
		3	-55±3	Impedance (at 100kHz±20%)			Z _{-55°C} /Z _{+20°C}	1.25
8	Damp heat (Steady state)	Temperature : 60±2°C Relative humidity : 90%~95%RH Duration: 500 hours			No visible damage Leakage current ≤ initial specified value Capacitance change: within ±20% of initial value tan δ ≤ 150% of initial specified value ESR ≤ 150% of initial specified value			
9	Endurance	Temperature : 105°C ±2°C Applied voltage : rated voltage Duration : 2,000 +20/-0 hours ※ The capacitors shall be stored under standard atmospheric conditions for 1 to 2 hours, after which measurement shall be made.			No visible damage Leakage current ≤ initial specified value Capacitance change: within ±20% of initial value tan δ ≤ 150% of initial specified value ESR ≤ 150% of initial specified value			
10	Capacitance (Tolerance)	Peak Temperature	250°C	260°C	No visible damage Leakage current ≤ initial specified value Capacitance change: within ±10% of initial value			
		Preheat	150°C~180°C 90±3 seconds		tan δ ≤ 130% of initial specified value			
		200°C over time(Max.)	60 seconds	60 seconds	ESR ≤ 130% of initial specified value			
		220°C over time(Max.)	50 seconds	50 seconds				
		230°C over time(Max.)	40 seconds	40 seconds				
		Reflow number	Twice or less	Only 1 time				

11. Rapid change of temperature

Applied voltage: No load
 Cycle number: 5 Cycles
 Test diagram: Fig. 1



Performance: After 5 cycles, the capacitors shall meet the following specification.

Item	Performance
Capacitance change	Within ±10% of initial capacitance
Tan δ	Less than or equal to the initial specified value
Leakage current	Less than or equal to the initial specified value

12. Solderability

Temperature: $245 \pm 5^\circ\text{C}$

Duration: 5 ± 0.5 seconds

Direction: X, Y, Z (3 axes)

Flux: Rosin (JIS K 5902) // Ethanol (JIS K 8101); About 25 wt. %

Performance: At least 95% of surface area of the dipped portion of the terminal shall be covered with new solder.

13. Resistance to soldering heat

Test condition:

13.1 Soldering bath method

Temperature: $260 \pm 10^\circ\text{C}$

Duration: 10 ± 1 seconds

*Heat protector ($t = 1.6\text{mm}$ glass-epoxy board)

13.2 Solder iron method

Temperature: $400 \pm 10^\circ\text{C}$

Duration: 3 ± 1 seconds

*Heat protector ($t = 1.6\text{mm}$ glass-epoxy board)

Performance: The capacitors shall meet the following specification after A or B test.

Item	Performance
Capacitance change	Within ± 10% of initial capacitance
Tan δ	Tan $\delta \leq 1.3$ times of initial specified value

14. Vibration

Frequency : 10 to 55 Hz (1 minute interval / 10 → 55 → 10 Hz)

Amplitude : 0.75mm (Total excursion 1.5mm)

Direction : X, Y, Z (3 axes)

Duration : 2 hours / axial (Total 6 hours)

Performance : The capacitance change is within ± 5% of the initial measured value.

15. Assured failure rate

The failure rate is 0.5%/1000 hours (with a 60% reliability standard)based on JIS C 5003.

16. Cleaning

Concerning about HCFC, higher alcohol system, petroleum system, terpene system, water system with surface active agent and other solvents the washing way (separateness or combinations) by soak, ultrasonic wave, boil, vapor etc. is confirmed under the maker's recommendation . Please contact us if you require further details.

17. Storage

17.1 Do not store capacitors at a high temperature and high humidity .Store the capacitors indoors at a temperature of +5 to +35°C and a humidity less than 75%RH.

(Table-1)

SMD	Before unsealing	After unsealing
	Within 24 months after delivery	Within 6 months after delivery

- 17.2 Store the capacitors in places free from water, oil or salt water.
- 17.3 Store the capacitors in places free from toxic gasses (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonium, etc.)
- 17.4 Store the capacitors in place out of ozone, ultraviolet rays or radiation.

18. Operating Precautions

This capacitor is the aluminum solid capacitors with Conductive Polymer electrolyte. Please note the following points in order to take full advantage of products performance, with most stable quality.

18.1 Polarity

Solid aluminum electrolytic capacitor is a polarized capacitor including positive and negative electrodes. Do not reverse the polarity when using. If it is used with the polarities reversed, increased leakage current or decreased life span may result.

18.2 Prohibited circuits

Since problems can be expected due to leakage current increasing during soldering and other processes, the capacitor cannot be used in the following circuits.

- a) High impedance circuits
- b) Coupling circuits
- c) Time constant circuits

* In addition to the leakage current fluctuation above, the operational conditions such as characteristics at high and low temperature, damp heat and endurance stipulated in the specifications will affect the capacitance. The fluctuation of the capacitance may cause problem if it is used as a time constant capacitor, which is extremely sensitive to the fluctuation of the capacitance. Do not use it as a time constant capacitor.

- d) Circuits to get bad influence by big leakage current
Additionally, please contact usage of two or more capacitors in series for voltage proof.

18.3 Overvoltage prohibited during design

Overvoltage exceeding the rated voltage may not be applied even for an instant as it may cause a short circuit.

18.4 Sudden charge and discharge restricted

Sudden charge and discharge restricted (for maintenance of high-proof reliability).
A protection circuit is recommended for when a sudden charge or discharge causes excessive rush current because this is a main cause of short circuits and large leakage current.
Use protection circuits under the following both cases;

- a) The rush current exceeds 10A.
- b) The rush current exceeds 10x the maximum allowable ripple current of capacitor.

Be sure to insert a protection resistor of about 1 KW for charge and discharge when measuring the leakage current.

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Use protection circuits under the following both cases;

- a) The rush current exceeds 10A.
- b) The rush current exceeds 10x the maximum allowable ripple current of capacitor.

Be sure to insert a protection resistor of about 1 KW for charge and discharge when measuring the leakage current.

18.5 Operating environmental restrictions

Do not use the capacitor in the following environments.

- a) Places where water, salt water or oil can directly fall on it, and places where condensation may form.
- b) Places filled with noxious gas (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.).
- c) Places susceptible to ozone, ultraviolet rays and radiation.

18.6 Mounting precautions

- a) Considerations when soldering

The soldering conditions are to be within the range prescribed in specifications. If the specifications are not followed, there is a possibility of the cosmetic deflection, the intensive increase of leakage current, and the capacitance reduction.

- b) Things to be noted before mounting

b-1) Do not reuse capacitor that have been assembled in a set and energized. Excluding capacitor that have been removed for measuring electrical characteristics during a periodic inspection, this capacitor cannot be reused.

b-2) Leakage current may increase when capacitors are stored for a long period of time.

In this case, apply rated voltage for 2 hours at 105°C with load of 1 KW resistor.

- c) Flow soldering

Do not use flow soldering for SMD type.

- d) Reflow soldering
 - d-1) Set the soldering conditions (soldering temperature, terminal submersion time) so that they fall within the stipulated range in the specifications. The leakage current value after soldering may increase a little (from a few μ A to several mA) depending on the soldering conditions (preheating and solder temperature and time, PCB material and thickness, etc.). The leakage current can be reduced through self-repair by applying voltage.
 - d-2) Reflow soldering may reduce the capacitance of products after soldering even when the soldering conditions are within the required value.
- e) Handling after soldering
 - Do not tilt, bend or twist the capacitor after it.

18.7 Disposal

Conducting polymer capacitor comprises solid organic compounds, various metals, rubber, etc. Treat it as industrial waste when disposing of it. In case of disposing a large amount of capacitors, the company can dispose on behalf.

18.8 Consideration when using in industrial equipment

To ensure reliability when the capacitor is used in industrial equipment, design must allow for its capacitance, impedance, and other characteristics.

18.9 Using in equipment regarding human life

In case of using in equipment regarding human life (e.g. Space equipment, aeronautic equipment and atomic equipment etc.), be sure to talk over the matter with supplier.
Don't use without recognition document of our company.

18.10. Hazardous substances for Environmental care

- a) Substances destroying ozone layer
 - Substances (class one and two) destroying the ozone layer are not contained in this kind of Capacitor. It is not used in manufacturing process of the capacitor.
- b) Bromine materials for flame-retardant Conducting polymer capacitor does not contain bromine materials of PBBOs or PBBs as the flame-retardant.

18.11 Others

Design circuits after checking the following items

- a) Electric characteristics are affected by temperature and frequency fluctuations.
 - Design circuits after checking the following items.
- b) When mounting an capacitor on a double-sided PC board, extra PC board holes and the through holes for connecting the front and back of the PCB must not exist underneath the capacitor.

Precautions with completed board

- (a) Do not touch the lead terminals of capacitor directly.
- (b) Do not use electric conductors to cause short circuits between the capacitor lead terminals.
 - Do not subject the capacitor to conductive solutions such as acids and alkaline water solutions.
- (c) Check the installation environment of the board the capacitor is installed in.
- (d) Age the board at conditions that fall below the capacitors ratings.
- (e) It is recommended that the board be used at room temperature and in ordinary humidity.

Note:

In case of some problems concerning industrial possessive rights of third party by using this product, we don't take responsibility except for what to be directly conceded with structure processes capacitor. Please design with safety measures taking into consideration any social damage, such as personal or fire accident when using this product.
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