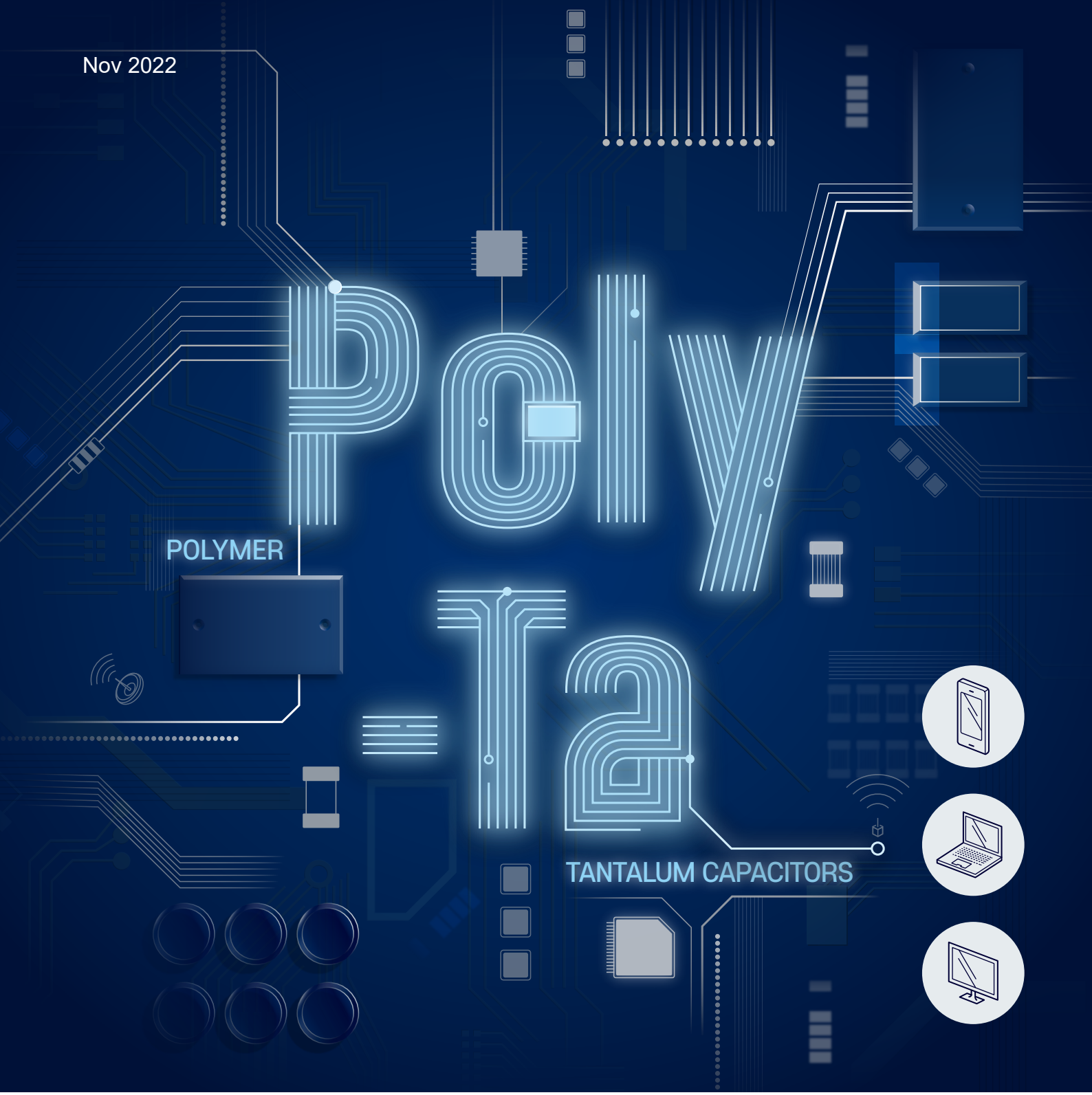
Nov 2022



POLYMER TANTALUM CAPACITORS

SAMSUNG ELECTRO-MECHANICS

SAMSUNG

We, Samsung, declare that our Polymer Tantalum Capacitor is produced in accordance with EU RoHS directive.

1. RoHS compliance and restriction of Br

The following restricted materials are not used in packaging materials as well as products incompliance with the law and restriction.

- Cd, Pb, Hg, Cr6+, As, Br and the compounds, PCB, asbestos
- Bromic materials: PBBs, PBBs, PBDO, PBDE, PBB
- Phthalate materials: DEHP, BBP, DBP, DIBP

2. No use of materials breaking Ozone layer

The following ODS materials are not used in our fabrication process.

- ODS materials: Freon, Haron, 1-1-1 TCE, CCl4, HCFC

If you want more information, please visit the website of Samsung Electro-Mechanics.
http://www.samsungsem.com

Contents

Guidelines for Using Polymer Tantalum Capacitor

Operational Attentions

Operating Voltage

It is recommended to use within 80% of the rated voltage.
In a circuit in which instantaneous current flows by switching or charging and discharging, a resistor of 3Ω or more per 1V of the applied voltage is connected in series.

Reverse Voltage

Since the solid electrolytic tantalum chip capacitor has polarity, the application of reverse voltage should be avoided.
The sum of the DC voltage and the negative peak ripple voltage should not allow a voltage reversal.

Ripple Voltage

The sum of DC voltage and peak ripple voltage should not exceed the rated voltage.
This is based on an ambient temperature of 25℃.

Restriction of Rapid Charge and Discharge

Rapid charge and discharge are restricted (for maintenance of high-proof reliability). A protection circuit is recommended for when a rapid charge or discharge causes excessive rush current because this is main cause of short circuit and large leakage current.
Use protection circuits when the rush current value exceeds 20A.
Be sure to insert a protection resistor of about 1KΩ for charge and discharge when measuring the leakage current.

Prohibited Circuits

Polymer tantalum capacitors should not be used in the following circuits.

① High impedance voltage retention circuits
② Time constant circuits
③ Coupling circuits
④ Circuit greatly affected by leakage current and ESR
⑤ Circuit in which two or more polymer tantalum capacitors are connected in series to increase withstand voltage

Guidelines for Using Polymer Tantalum Capacitor

Mounting

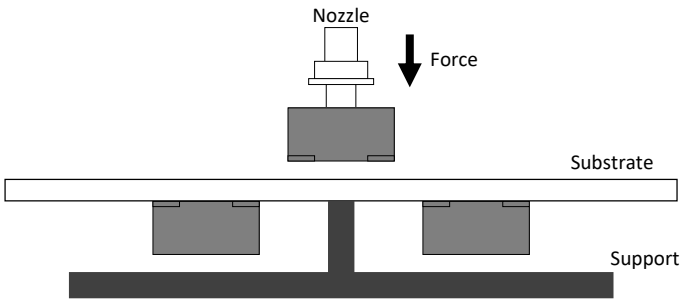
Caution before Mounting

A capacitor that has been damaged should be discarded to avoid later problems resulting from mechanical stress.
Printed circuit boards on which capacitors are mounted should have a low thermal expansion coefficient.
In reflow soldering, if footprints on printed circuit boards are much wider than the capacitor terminals, the capacitor position may shift when the solder melts.

Caution during Mounting with Mounting (pick-and-place) Machine

① Mounting Head Pressure
Excessive pressure may cause cracks in capacitor.
It is recommended to adjust the nozzle pressure within the maximum value of 300g.f.

② Bending Stress
When using a two-sided substrate, it is required to mount capacitor on one side first before mounting on the other side due to the bending of the substrate caused by the mounting head. Support the substrate as shown in the picture below when capacitor is mounted on the other side. If the substrate is not supported, bending of the substrate may cause cracks in capacitor.



③ Suction Nozzle
Dust accumulated in a suction nozzle and suction mechanism can impede a smooth movement of the nozzle. This may cause cracks in capacitor due to the excessive force during mounting.
If the mounting claw is worn out, it may cause cracks in capacitor due to the uneven force during positioning. A regular inspection such as maintenance, monitor and replacement for the suction nozzle and mounting claw should be conducted.

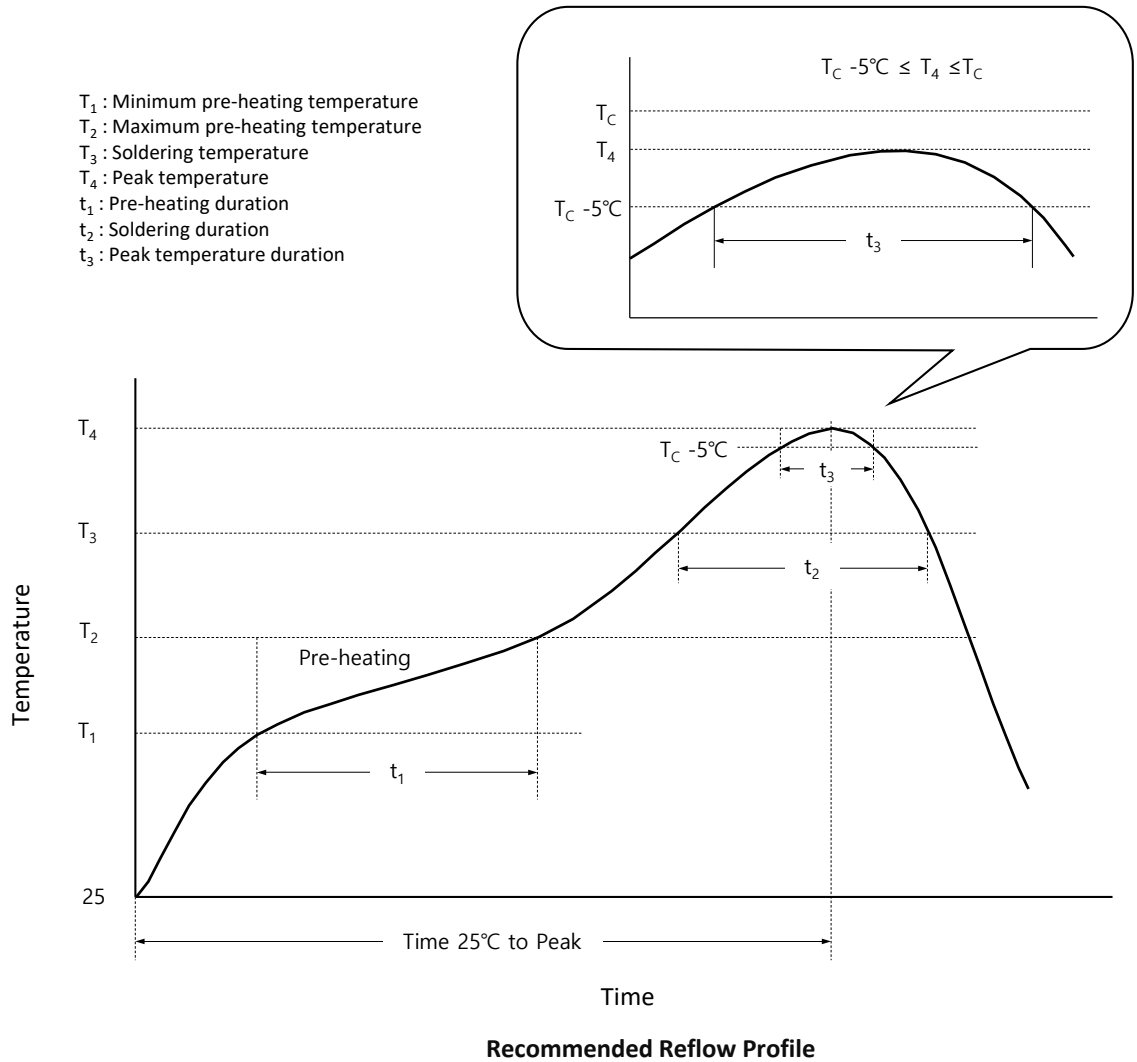
Guidelines for Using Polymer Tantalum Capacitor

Soldering

Reflow Soldering

Polymer tantalum capacitors must be attached to the substrate according to an appropriate method to prevent unexpected defects in the assembly process.
Reflow soldering is recommended to attach the tantalum capacitor.
The assembly substrate must be preheated before reflow soldering is performed.
As shown below, it should not exceed 260℃ and 5 seconds, and it is recommended to keep the number of reflow repetitions less than 3 times.

T_1 : Minimum pre-heating temperature
T_2 : Maximum pre-heating temperature
T_3 : Soldering temperature
T_4 : Peak temperature
t_1 : Pre-heating duration
t_2 : Soldering duration
t_3 : Peak temperature duration



Recommended Reflow Profile

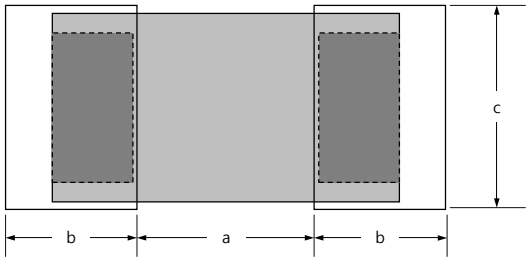
Hand Soldering

When mounting using a soldering iron, make sure that it does not directly touch the chip.
The recommended conditions are as follows.

① Power: 30W
② Iron core temperature: Max 350°C
③ Time: 3 seconds or less

Guidelines for Using Polymer Tantalum Capacitor

Land Dimension



[Unit: mm]

Size	PCF, PBL Series			PFT Series		
	a	b	c	a	b	c
1005	0.5	0.35	0.4	0.5	0.45	0.4
1608	0.8	0.55	0.6	0.8	0.6	0.6
2012	1.0	0.7	0.9	1.0	0.8	0.9
3216	1.6	1.0	1.2	1.6	1.1	1.2
3528	1.9	1.0	2.2	1.9	1.1	2.2
7343	4.7	1.5	2.4	4.7	1.6	2.4

Storage

When storing the polymer tantalum capacitor, it is necessary to maintain an environment capable of preventing deterioration of solderability and moisture absorption. It should be kept sealed in the Moisture Barrier Bag under 5~40 °C and 20~60% RH conditions. Do not leave the remaining amount after opening. If the remaining amount is inevitably left, it should be put in MBB and resealed.

The polymer tantalum capacitor must follow the following usage conditions after opening.

Level	Floor Life (Out of Bag)	
	Time	Condition
3	168 hrs	≤30℃ / 60%RH

Polymer tantalum capacitors should not be stored in the following places.

① A place where direct sunlight shines
② A damp place with water, dew, condensation, oil, etc.
③ Places filled with toxic gases (e.g., hydrogen sulfide, sulfur dioxide, nitrous acid, chlorine, ammonia, etc.)
④ A place that can be exposed to ozone, ultraviolet rays, radiation, etc.;

Part Numbering

TC	PCF	0J	226	M	J	A	R	0030
1	2	3	4	5	6	7	8	9

1. PRODUCT NAME

TC = Tantalum Capacitors

2. SERIES

3. RATED VOLTAGE

Code	0D	0E	0G	0J	1A	1C	1D	1E	1V
R.V (V)	2	2.5	4	6.3	10	16	20	25	35

※ The rated voltages not in the table above are indicated by double digits number.

4. CAPACITANCE

Code	Pico Farad	Micro Farad	Code	Pico Farad	Micro Farad
106	$10x10^6$	10	107	$10x10^7$	100

※ First two digits represent significant figures and third digit represents multiplier in pF.

5. CAPACITANCE TOLERANCE

K = ±10%, M = ±20%

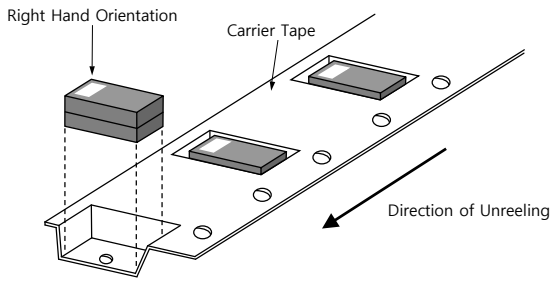
6. CASE CODE

7. REEL SIZE

A = 7 inches, C = 13 inches

8. TAPING DIRECTION

R = Right Hand Orientation
; polarity marking on the opposite side of sprocket hole



9. ESR/HEIGHT

4 Numbers ; ESR Spec (mOhm)
(ex) 0100 = 100 mOhm, 0050 = 50 mOhm

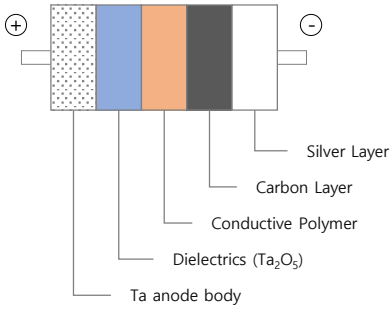
3 Numbers + 1 Character ; ESR Spec + H code
3 Numbers = ESR Spec (mOhm)
First two digits represent significant figures.
Third digit represents decimal multiple (x 10^n, n; integer).
1 Character = H Code (max Height in mm)

(ex) 500S = 50 (50 x 10^0) mOhm, max 1.0mm
201T = 200 (20 x 10^1) mOhm, max 0.9mm

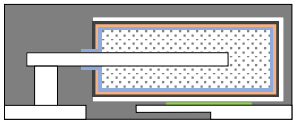
Product Information

Structure

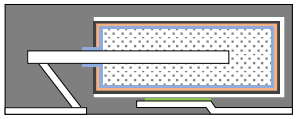
Structure of Element



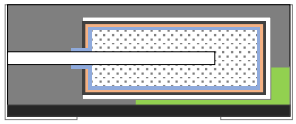
PCF Series



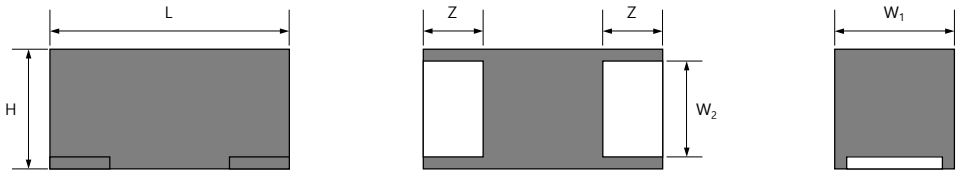
PBL Series



PFT Series



Dimension



[Unit: mm]

Case code	EIA	H code*1	L	W_1	W_2	H	Z
K	1608-09		1.6±0.2	0.8±0.2	0.6±0.1	0.8±0.1	0.4±0.1
J	1608-10		1.6±0.2	0.8±0.2	0.6±0.1	0.9±0.1	0.4±0.1
P	2012-06	B	2.0±0.2	1.25±0.2	0.9±0.1	0.65max	0.5±0.2
O	2012-08		2.0±0.2	1.25±0.2	0.9±0.1	0.7±0.1	0.5±0.2
N	2012-09		2.0±0.2	1.25±0.2	0.9±0.1	0.8±0.1	0.5±0.2
R	2012-10		2.0±0.2	1.25±0.2	0.9±0.1	0.9±0.1	0.5±0.2
A	3216-10	S	3.2±0.2	1.6±0.2	1.2±0.1	0.9±0.1	0.8±0.2
S	3216-12		3.2±0.2	1.6±0.2	1.2±0.1	1.1±0.1	0.8±0.2
A	3216-18		3.2±0.2	1.6±0.2	1.2±0.1	1.6±0.2	0.8±0.2
B	3528-10	S	3.5±0.2	2.8±0.2	2.2±0.1	0.9±0.1	0.8±0.2
T	3528-12		3.5±0.2	2.8±0.2	2.2±0.1	1.1±0.1	0.8±0.2
B	3528-20		3.5±0.2	2.8±0.2	2.2±0.1	1.9±0.1	0.8±0.2
G	7343-15		7.3±0.2	4.3±0.2	2.4±0.1	1.4±0.1	1.3±0.2
W	7343-20		7.3±0.2	4.3±0.2	2.4±0.1	1.9±0.1	1.3±0.2
D	7343-30		7.3±0.2	4.3±0.2	2.4±0.1	2.8±0.2	1.3±0.2

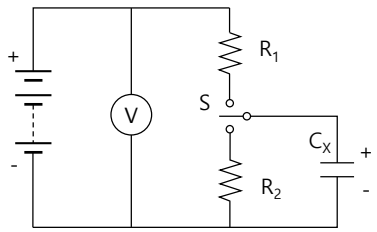
*1 H code only available on PFT series parts

Ratings & Part Number Reference

Please refer to the website below for detailed specifications of each model.

http://product.samsungsem.com

Characteristics Performance

Item	Characteristics	Test Condition
Surge voltage	· Change in capacitance : within ±20% of initial value · Dissipation Factor : within initial limit · Leakage Current : within 3 x initial limit	· Applied voltage: Surge voltage · Temperature: 85℃ · Test condition Charging: 30 ± 5 sec Discharging: 5.5 ± 0.5 min Repetition: 1,000 cycles  R_1: Protective resistor (33Ω) R_2: Discharge resistor (33Ω) Ⓥ: DC voltmeter or electronic voltmeter S: Switch C_X: Test capacitor
Load life (Endurance)	· Change in capacitance : within ±20% of initial value*1 : within ±30% of initial value*2 · Dissipation Factor : within 1.5 x initial limit at 85℃ : within 3 x initial limit at 105℃ · Leakage Current : within 1.5 x initial limit · No sign of remarkable damage	· Applied voltage For parts with rated temperature of 85℃ - Rated voltage @ 85℃ - Derated voltage @ 105℃ For parts with rated temperature of 105℃ - Rated voltage · Time: 2,000 (+72/-0) hrs · Measurement should be made after a cooling time of 4 hours or more at room temperature.
Moisture resistance	· Change in capacitance : within -20 ~ +35% of initial value*1 : within -30 ~ +35% of initial value*2 · Dissipation Factor : within 1.5 x initial limit · Leakage Current : within 3 x initial limit · No sign of remarkable damage	· Temperature: 40 ± 2℃ · Humidity: 90 ~ 95% RH · Applied voltage: No load · Duration: 500 (+8/-0) hrs · Measurement should be made after a cooling time of 4 hours or more at room temperature.

*1 Category 1
*2 Category 2

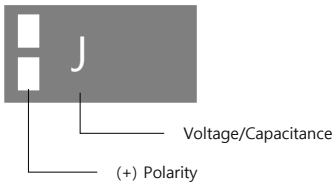
Applied voltage for reliability test

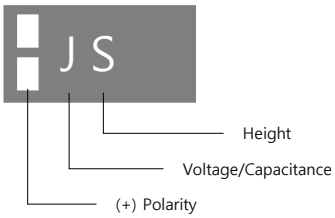
[Unit: Volts]

Rated Voltage (@ 85℃)	2.5	4	6.3	8	10	15	16	18	20	25	35	38
Surge Voltage (@ 85℃)	3.3	5.2	8.2	10.4	13.0	19.5	20.8	23.4	26.0	32.5	45.5	49.4
Derated Voltage (@ 105℃)	2.0	3.2	5.0	6.4	8.0	12.0	12.8	14.4	16.0	20.0	28.0	30.4

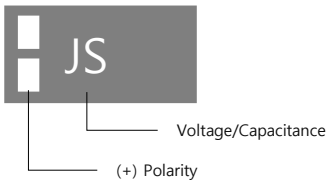
Marking

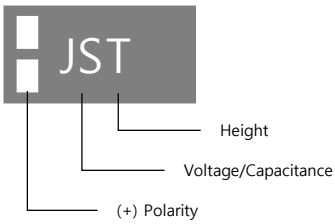
1608 size





2012 size





Marking code references

1608 size

Capacitance \ Voltage	2.5	4	6.3	10	16	20
22			J			

2012 size

Capacitance \ Voltage	6.3	8	25	38
1.0				XA
3.3			EN	
4.7			ES	
22		KJ		
33		KN		
47	JS	KS		

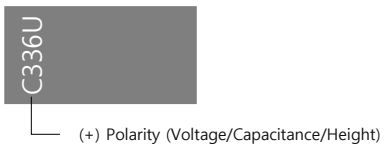
H code reference

[Unit: mm]

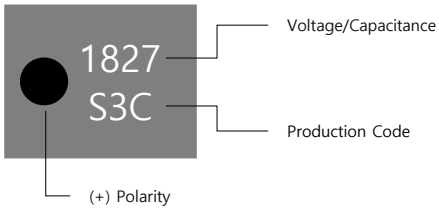
Code	I	J	K	L	M	N	O	P	Q	R
H_{max}	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1
Code	S	T	U	W	X	Y	A	B	Z	
H_{max}	1.0	0.9	0.8	0.7	0.6	0.5	0.55	0.65	0.95	

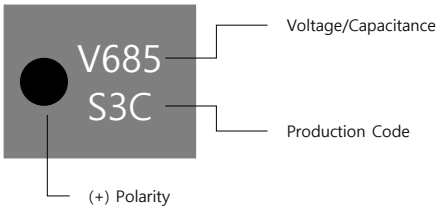
Marking

3216 size

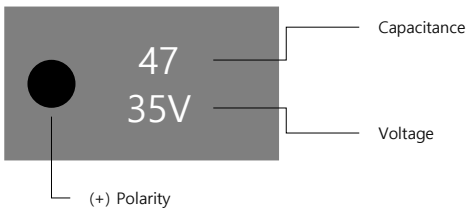


3528 size





7343 size

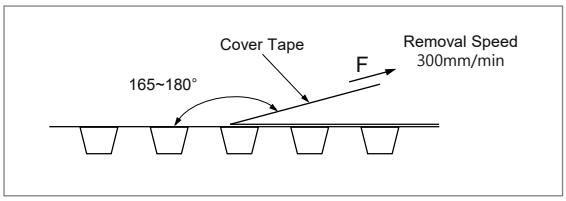


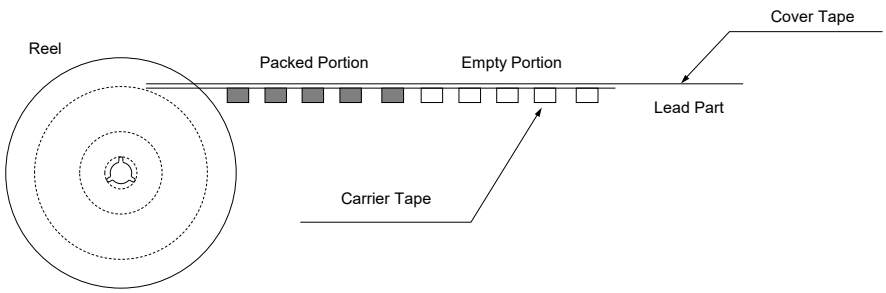
Packaging Specification

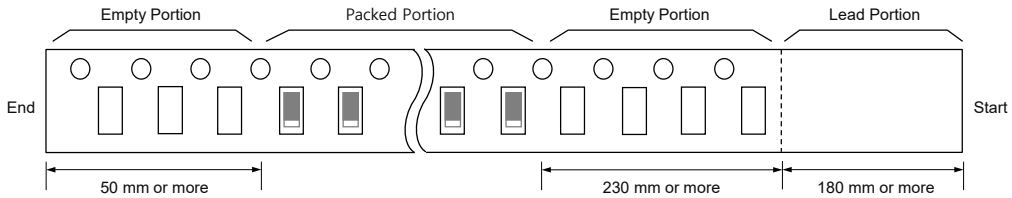
Packaging

The tantalum chip capacitors shall be packaged in a tape and reel form for effective use.

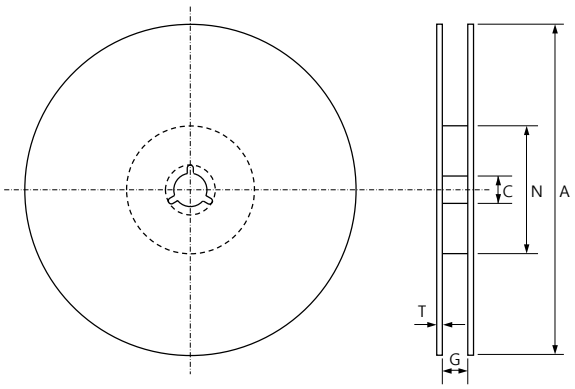
Carrier tape: Semi-transparent embossed plastic
Cover tape: Attached by heating press, polyester







Reel Dimension

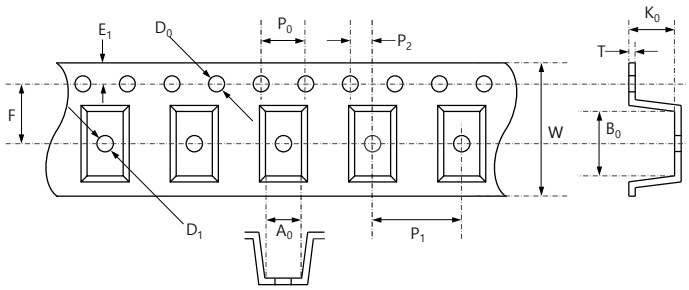


[Unit: mm]

Reel	Tape Width	A +0/-3.0	N Min.	C ±0.3	G ±0.5	T ±0.2
7 inch	8mm	180	60	13	9	1.2
	12mm	180	60	13	13	1.2
13 inch	8mm	330	80	13	9	2.0
	12mm	330	80	13	13	2.0

Packaging Specification

Carrier Tape Dimension



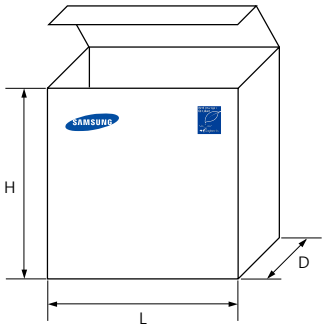
[Unit: mm]

EIA Code	Chip Height	Case Code	W (+0.3/-0.1)	P_1 (±0.1)	E_1 (±0.1)	F (±0.05)	D_0 (+0.1/-0)	D_1 (+0.25/-0)	P_0 (±0.1)	P_2 (±0.05)	A_0 (±0.1)	B_0 (±0.1)	K_0 (±0.1)	T (±0.02)
1608	0.9	K	8.0	4.0	1.75	3.5	1.5	0.5	4.0	2.0	0.98	1.8	1.0	0.23
	1.0	J	8.0	4.0	1.75	3.5	1.5	0.6	4.0	2.0	1.1	1.9	1.1	0.23
2012	0.65	P	8.0	4.0	1.75	3.5	1.5	1.0	4.0	2.0	1.5	2.34	0.75	0.23
	0.8	O	8.0	4.0	1.75	3.5	1.5	1.0	4.0	2.0	1.5	2.34	1.1	0.23
	0.9	N	8.0	4.0	1.75	3.5	1.5	1.0	4.0	2.0	1.5	2.34	1.1	0.23
	1.0	R	8.0	4.0	1.75	3.5	1.5	1.0	4.0	2.0	1.5	2.34	1.1	0.23
3216	1.0	A	8.0	4.0	1.75	3.5	1.5	1.0	4.0	2.0	1.85	3.48	1.4	0.23
	1.2	S	8.0	4.0	1.75	3.5	1.5	1.0	4.0	2.0	1.85	3.48	1.4	0.23
	1.8	A	8.0	4.0	1.75	3.5	1.5	1.0	4.0	2.0	1.85	3.48	1.85	0.27
3528	1.0	B	8.0	4.0	1.75	3.5	1.5	1.0	4.0	2.0	3.2	3.83	1.4	0.23
	1.2	T	8.0	4.0	1.75	3.5	1.5	1.0	4.0	2.0	3.2	3.83	1.4	0.23
	2.0	B	8.0	4.0	1.75	3.5	1.5	1.0	4.0	2.0	3.2	3.83	2.17	0.23
7343	1.5	G	12.0	8.0	1.75	5.5	1.5	1.5	4.0	2.0	4.67	7.67	2.1	0.26*1
	2.0	W	12.0	8.0	1.75	5.5	1.5	1.5	4.0	2.0	4.67	7.67	2.1	0.26*1
	3.0	D	12.0	8.0	1.75	5.5	1.5	1.5	4.0	2.0	4.8	7.67	3.2	0.25

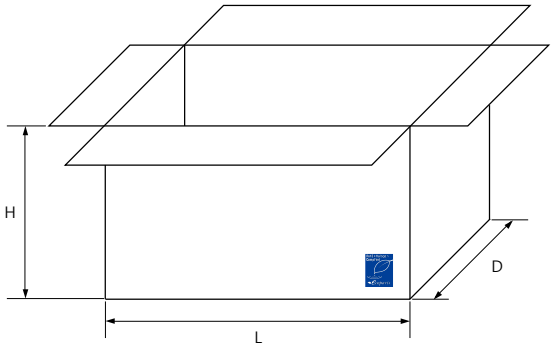
*1 Tolerance: ±0.03

Packaging Specification

Packaging Box



[Inner Box]



[Outer Box]

[Unit: mm]

Reel	Item	L	D	H
7 inch	Inner box	230±2	68±2	221±2
	Outer box	475±5	355±5	229±5
13 inch	Inner box	335±3	90±3	342±3
	Outer box	370±5	340±5	350±5

Packaging Quantity

[Unit: pcs]

Size			Case Code	Reel	
EIA	Inch	H_{max}, mm		7 inch	13 inch
1608-09	0603	0.9	K	4,000	-
1608-10	0603	1.0	J	4,000	-
2012-06	0805	0.65	P	4,000	-
2012-08	0805	0.8	O	3,000	-
2012-09	0805	0.9	N	3,000	-
2012-10	0805	1.0	R	3,000	-
3216-10	1206	1.0	A	3,000	-
3216-12	1206	1.2	S	3,000	-
3216-18	1206	1.8	A	2,000	-
3528-10	1411	1.0	B	3,000	-
3528-12	1411	1.2	T	3,000	-
3528-20	1411	2.0	B	2,000	-
7343-15	2917	1.5	G	1,000	4,000
7343-20	2917	2.0	W	1,000	3,000
7343-30	2917	3.0	D	500	2,000

Disclaimer & Limitation of Use and Applications

Disclaimer

The products listed as follows are NOT designed and manufactured for any use and applications set forth below. Please note that any misuse of the products deviating from products specifications or information provided in this Spec sheet may cause serious property damages or personal injury.

① Aerospace/Aviation equipment
② Automotive of Transportation equipment (vehicles, trains, ships, etc.)
③ Military equipment
④ Atomic energy-related equipment
⑤ Undersea equipment
⑥ Any other applications with the same as or similar complexity or reliability to the applications

Limitation

Please contact us with usage environment information such as voltage, current, temperature, or other special conditions before using our products for the applications listed below. The below application conditions require especially high reliability products to prevent defects that may directly cause damages or loss to third party's life, body or property.
If you have any questions regarding this 'Limitation', you should first contact our sales personnel or application engineers.

① Medical equipment
② Disaster prevention/crime prevention equipment
③ Power plant control equipment
④ Traffic signal equipment
⑤ Data-processing equipment
⑥ Electric heating apparatus, burning equipment
⑦ Safety equipment
⑧ Any other applications with the same as or similar complexity or reliability to the applications

Quality System Certification

Certification Lists of Philippines Factory

IATF 16949

Authority
BSI

Number
IATF_91430-005

Date
2021-08-17

Validity
2024-08-16

QC 080000

Authority
IECQ

Number
IECQ-H_ULTW_10.0016

Date
2022-06-27

Validity
2025-07-04

ISO 14001

Authority
BSI

Number
EMS_77354

Date
2021-07-13

Validity
2024-07-12

ISO 45001

Authority
BSI

Number
OHS_568723

Date
2022-10-14

Validity
2025-10-13

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