

Apr 2022

Polymer Tantalum Capacitor

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 in compliance 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>

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Guidelines for Using Polymer Tantalum Capacitor

Operational Attentions

Operating Voltage

- ① It is recommended to use within 80% of the rated voltage.
- ② 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

- ① Since the solid electrolytic tantalum chip capacitor has polarity, the application of reverse voltage should be avoided.
- ② The sum of the DC voltage and the negative peak ripple voltage should not allow a voltage reversal.

Ripple Voltage

- ① The sum of DC voltage and peak ripple voltage should not exceed the rated voltage.
- ② This is based on an ambient temperature of 25°C.

Restriction of Rapid Charge and Discharge

- ① 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.
- ② Use protection circuits when the rush current value exceeds 20A.
- ③ Be sure to insert a protection resistor of about $1K\Omega$ for charge and discharge when measuring the leakage current.

Prohibited Circuits

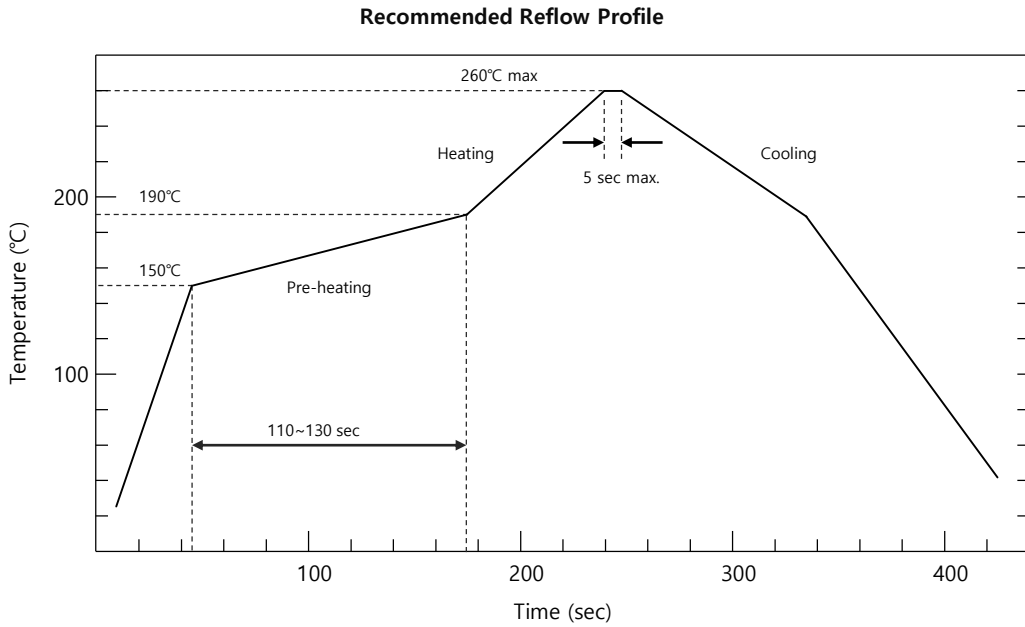
Polymer tantalum capacitors should not be used in the following circuits.

- 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

Soldering

Reflow Soldering

- ① Polymer tantalum capacitors must be attached to the substrate according to an appropriate method to prevent unexpected defects in the assembly process.
- ② Reflow soldering is recommended to attach the tantalum capacitor.
- ③ The assembly substrate must be preheated before reflow soldering is performed.
- ④ As shown below, it should not exceed 260°C and 5 seconds, and it is recommended to keep the number of reflow repetitions less than 3 times.

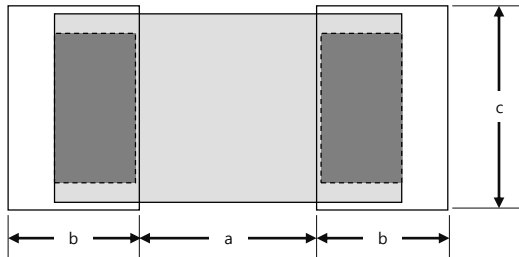


Hand Soldering

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: 350°C Max.
- ③ Time: 3 seconds or less

Land Dimension



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°C / 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 SIZE

7. PACKAGING

A = 7 inches, C = 13 inches

8. TAPING OR SPECIAL CODE

R = Polarity Marking on the Opposite Side of Sprocket Hole

9. ESR SPECIFICATION AND/OR THICKNESS

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 10ⁿ, n; integer).
1 Character = H Code (max Thickness in mm)
(ex) 500S = 50 (50 x 10⁰) mOhm, max 1.0mm
201T = 200 (20 x 10¹) mOhm, max 0.9mm

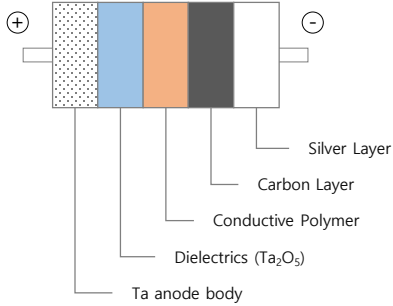
H Code Reference

Code	I	J	K	L	M	N	O	P	Q	R
Tmax	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	
Tmax	1.0	0.9	0.8	0.7	0.6	0.5	0.55	0.65	0.95	

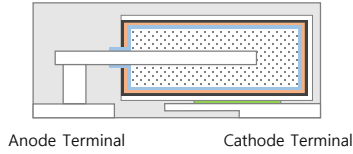
Product Information

Structure

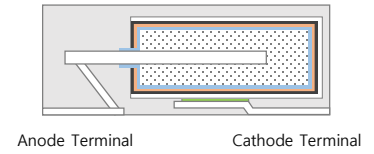
Structure of Element



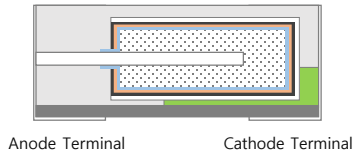
PCF Series



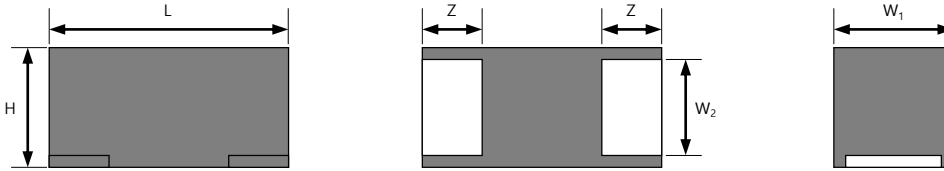
PBL Series



PFT Series



Dimension



Case Code	EIA Code	H code	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
P	2012-12		2.0±0.2	1.25±0.2	0.9±0.1	1.1±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

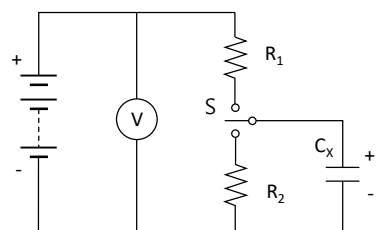
Ratings & Part Number Reference

Please refer to the web site below for detailed specifications for each model.

<http://product.samsungsem.com>

The specification and designs contained herein may be subjected to change without notice. Please contact our sales representatives or application engineers before order.

Characteristics Performance

ITEM	Characteristics	Test Condition
Surge Voltage	<ul style="list-style-type: none"> Change in capacitance : within 20% of initial value Dissipation Factor : within initial limit Leakage Current : within 3 x initial limit 	<ul style="list-style-type: none"> Applied voltage: Surge voltage Temperature: 85°C Test Method <ul style="list-style-type: none"> Charging: 30 ± 5 sec Discharging: 5.5 ± 0.5 min Repetition: 1,000 cycles  <p> R1: Protective resistor (33Ω) R2: Discharge resistor (33Ω) V: DC voltmeter or electronic voltmeter S: Switch C_x: Test capacitor </p>
Load life (Endurance)	<ul style="list-style-type: none"> Change in capacitance : within -20 ~ +35% of initial value¹ : within -30 ~ +35% of initial value² Dissipation Factor : within 1.5 x initial limit at 85°C : within 3 x initial limit at 105°C Leakage Current : within 1.5 x initial limit No mechanical damage 	<ul style="list-style-type: none"> Applied voltage <ul style="list-style-type: none"> 85°C warranty model <ul style="list-style-type: none"> Rated voltage @ 85°C Derated voltage @ 105°C 105°C warranty model <ul style="list-style-type: none"> Rated voltage Time: 2,000 (+72/-0) hrs Measurement shall be made after more than 4 hours of cooling time at room temperature.
Moisture resistance	<ul style="list-style-type: none"> Change in capacitance : within -20 ~ +35% of initial value¹ : within -30 ~ +35% of initial value² Dissipation Factor : within 1.5 x initial limit Leakage Current : within 3 x initial limit No mechanical damage 	<ul style="list-style-type: none"> Temperature: 40 ± 2°C Humidity: 90 ~ 95% RH Applied voltage: No load Duration: 500 (+8/-0) hrs Measurement shall be made after more than 4 hours of cooling time at room temperature.

¹ Category 1

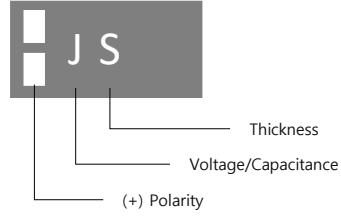
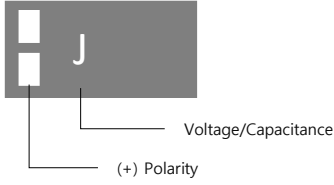
² Category 2

Applied voltage for reliability test

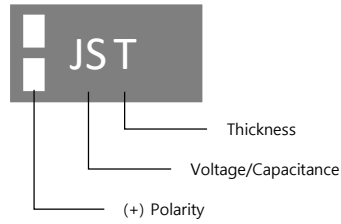
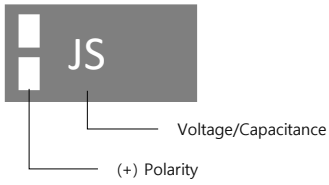
Rated Voltage (85°C)	2.5	4	6.3	8	10	15	16	18	20	25	35	38
Surge Voltage (85°C)	3.3	5.2	8.2	10.4	13.0	19.5	20.8	23.4	26.0	32.5	45.5	49.4
Derated Voltage (105°C)	2.0	3.2	5.0	6.4	8.0	12.0	12.8	14.4	16.0	20.0	28.0	30.4

Marking

1608 size



2012 size



Marking Code References

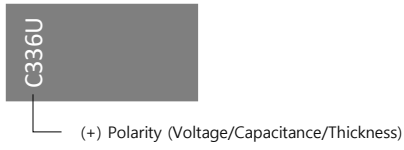
1608 size

Voltage / Capacitance	2.5	4	6.3	10	16	20
22			J			

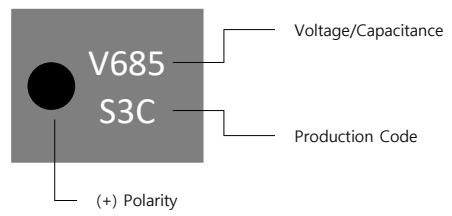
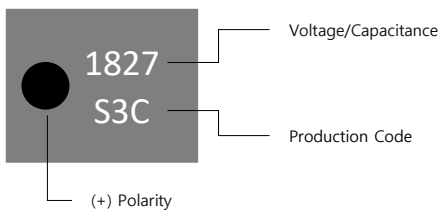
2012 size

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

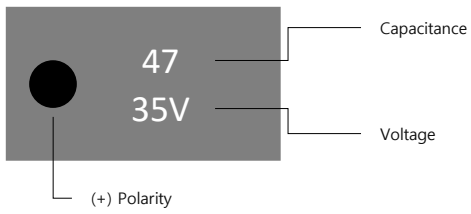
3216 size



3528 size



7343 size

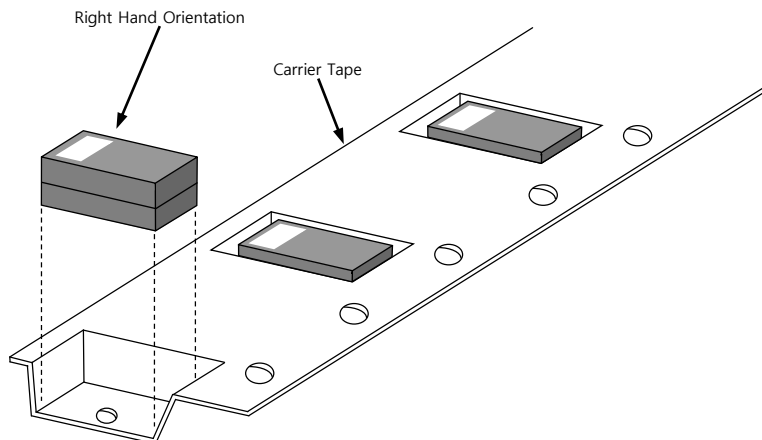
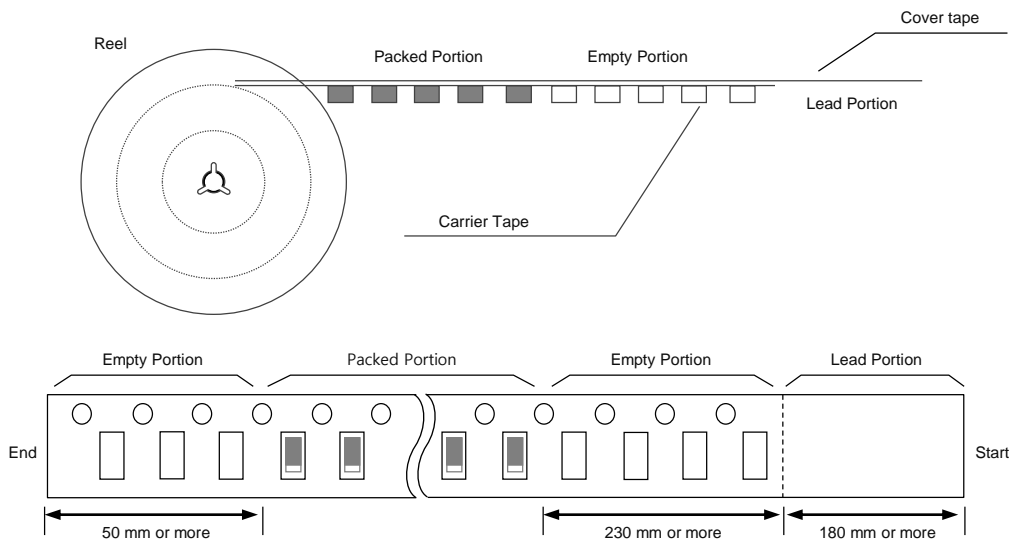
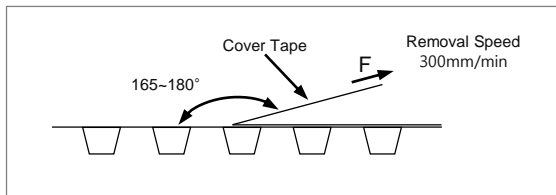


Packaging Specification

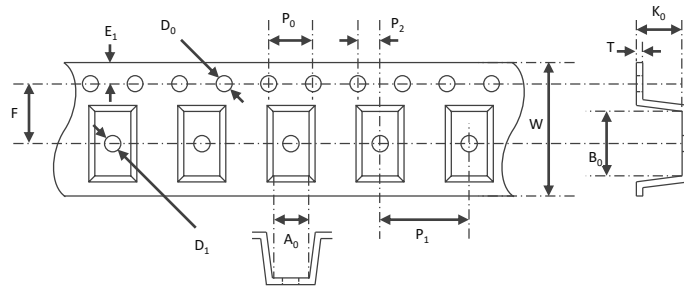
Packaging

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

Carrier tape: Semitransparent embossed plastic
Cover tape: Attached by heating press, polyester



Carrier Tape Dimension

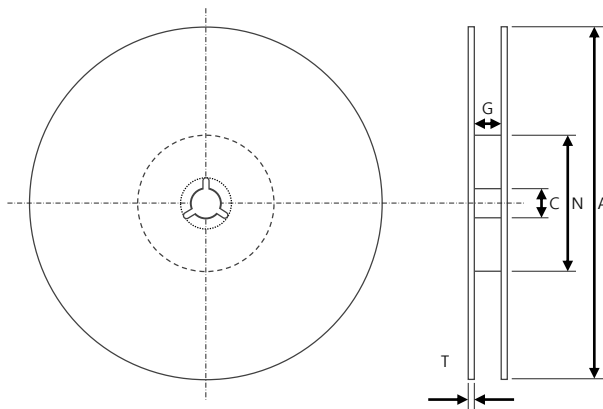


[Unit: mm]

EIA Code	Chip Thickness	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	J, 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
	0.8~1.0	O, N, 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	1.0~1.2	A, 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
	1.6~1.8	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	0.9~1.2	B, 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	1.5~2.0	G, 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 [†]

[†] Tolerance: ±0.03

Reel Dimension

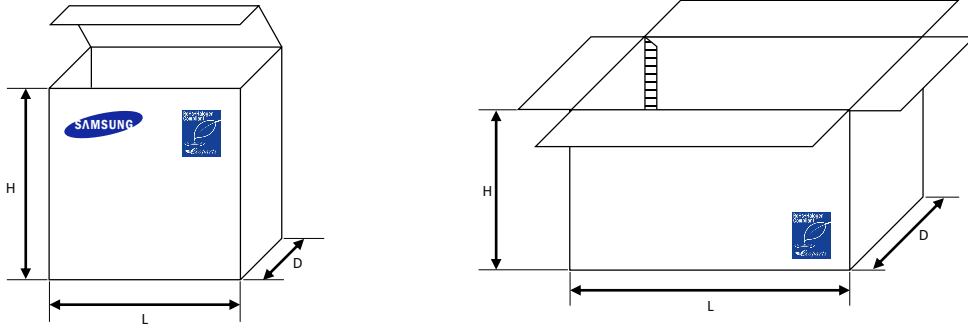


[Unit: mm (inch)]

Reel	Tape Width	A +0/-3.0	N Min.	C ±0.3	G ±0.5	T ±0.2
7 inch	8mm	180 (7)	60 (2.362)	13 (0.512)	9 (0.354)	1.2 (0.047)
	12mm	180 (7)	60 (2.362)	13 (0.512)	13 (0.512)	1.2 (0.047)
13 inch	8mm	330 (13)	80 (3.150)	13 (0.512)	9 (0.354)	2.0 (0.079)
	12mm	330 (13)	80 (3.150)	13 (0.512)	13 (0.512)	2.0 (0.079)

The specification and designs contained herein may be subjected to change without notice. Please contact our sales representatives or application engineers before order.

Packaging Box



[Unit: mm]

Reel Size	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	Hmax, 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

 <p>bsi. Certificate of Registration QUALITY MANAGEMENT SYSTEM - IATF 16949:2016</p> <p>This is to certify that Samsung Electro-Mechanics Philippines Corp. operates a Quality Management System which complies with the requirements of IATF 16949:2016 for the following scope: The design and manufacture of multi-layer ceramic capacitors, tantalum chip capacitors, and other electronic components including electronic devices, lead and Pb-free electronic components, interconnects, filter and chip resistors.</p> <p>For and on behalf of ISO: <i>[Signature]</i> Managing Director, HR Asia Region - Inter-Pu</p> <p>BSI Certificate Number: 91430-005 IATF Number: 042485 Certificate Date: 2021-08-17 Latest Review: 2024-08-16</p>	<p>IATF 16949</p> <p>Authority BSI</p> <p>Number IATF_91430-005</p> <p>Date 2021-08-17</p> <p>Validity 2024-08-16</p>	 <p>IEC QUALITY ASSESSMENT SYSTEM (IECQ) Covering Electronic Components, Assemblies, Related Materials and Processes</p> <p>IECQ Certificate of Conformity Hazardous Substance Process Management</p> <p>IECQ Certificate No.: IECQ-H_U_LTW_10.0016 Issue No.: 7 Status: Current Supervisor: <i>[Signature]</i> Issue Date: 2019-07-02 City Issue: 20190702 CIS Reference No.: 2009-076-001 Expiration: 2022-07-04</p> <p>Applicable to: • European Directive 2011/65/EU (RoHS) - Restriction of the use of certain Hazardous Substances in electrical and electronic equipment, including all published amendments • Other Identified Hazardous Substances</p> <p>The organization has developed and implemented Hazardous Substance Process Management procedures and related processes which have been reviewed and found to comply with the applicable requirements for IECQ HSPM registration against details in accordance with the IECQ HSPM IECQ 17 and Rules of Procedure IECQ 15.5 "IECQ Hazardous Substances Process Management" of the IECQ Quality Assessment System for Electronic Components (IECQ) and all associated IECQ Specifications.</p> <p>This Certificate is applicable to all electronic components, assemblies, related materials and processes for the following scope of activity: The design and manufacture of multi-layer ceramic capacitors, tantalum capacitors, crystal oscillators, chip inductor and multi-frequency resonating components.</p> <p>Issued by the Certification Body: DQS Group - DQS Taiwan Inc. No. 11, 25, Yuan-Hsun Road, Sec. 2, Taipei City, Taiwan Authorized person: <i>[Signature]</i> Risk Chang</p>	<p>QC 080000</p> <p>Authority IECQ</p> <p>Number IECQ-H_ULTW_10.0016</p> <p>Date 2019-07-02</p> <p>Validity 2022-07-04</p>
 <p>bsi. Certificate of Registration ENVIRONMENTAL MANAGEMENT SYSTEM - ISO 14001:2015</p> <p>This is to certify that Samsung Electro-Mechanics Philippines Corp. operates an Environmental Management System which complies with the requirements of ISO 14001:2015 for the following scope: The manufacture of multi-layer ceramic capacitors, tantalum chip capacitors, crystal units, and other electronic components including electronic devices, lead and Pb-free electronic components, interconnects, filter and chip resistors.</p> <p>For and on behalf of ISO: <i>[Signature]</i> Chief Operating Head of Compliance & Risk - Asia Pacific</p> <p>Original Registration Date: 2005-08-14 Effective Date: 2021-07-13 Latest Revision Date: 2023-07-06 Expiry Date: 2024-07-12</p>	<p>ISO 14001</p> <p>Authority BSI</p> <p>Number EMS_77354</p> <p>Date 2021-07-13</p> <p>Validity 2024-07-12</p>	 <p>bsi. Certificate of Registration OCCUPATIONAL HEALTH & SAFETY MANAGEMENT SYSTEM - ISO 45001:2018</p> <p>This is to certify that SAMSUNG ELECTRO-MECHANICS VIETNAM CO., LTD. operates an Occupational Health and Safety Management System which complies with the requirements of ISO 45001:2018 for the following scope: The Manufacture of Ceramic Modules including L-matchers and Actuators, Flexible Printed Circuit Board (FPCB) and Substrate Printed Circuit Board (SPCB). (Previously verified by BS IAFAS 18001:2007 since 2017/08/05)</p> <p>For and on behalf of ISO: <i>[Signature]</i> Chief Operating Head of Compliance & Risk - Asia Pacific</p> <p>Original Registration Date: 2020-09-07 Effective Date: 2020-09-08 Latest Revision Date: 2023-09-07 Expiry Date: 2025-09-07</p>	<p>ISO 45001</p> <p>Authority BSI</p> <p>Number OHS_568723</p> <p>Date 2019-10-14</p> <p>Validity 2022-10-13</p>

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**SAMSUNG
ELECTRO-MECHANICS**