



Specification No. JECXDE-9033B

Product Specification

Issued Date: July 27, 2017

Part Description: Supercapacitor (EDLC)

Customer Part No.: _____

MURATA Part No.: DMHA14R5V353M4ATA0

Acknowledgement of reception

We have received the attached specification

Date:

Company:

Dept.:

Representative

Received by

(Signature)
(Type)

(Signature)
(Type)

Technical Dept.

Prepared by

(Signature)
(Type)

Murata Manufacturing Co., Ltd.
High Performance Power Device Department
Planning and Promotion Sec.

Representative

(Company name/Dept.)

(Signature)
(Type)

1. Scope

This product specification is applied to supercapacitor (EDLC) used for consumer and industrial electronics market.

Please contact us when using this product for any other applications than described in the above.

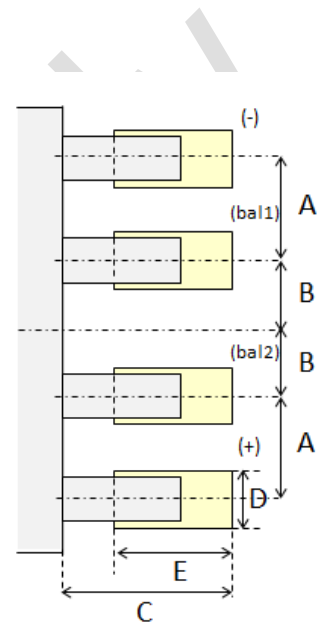
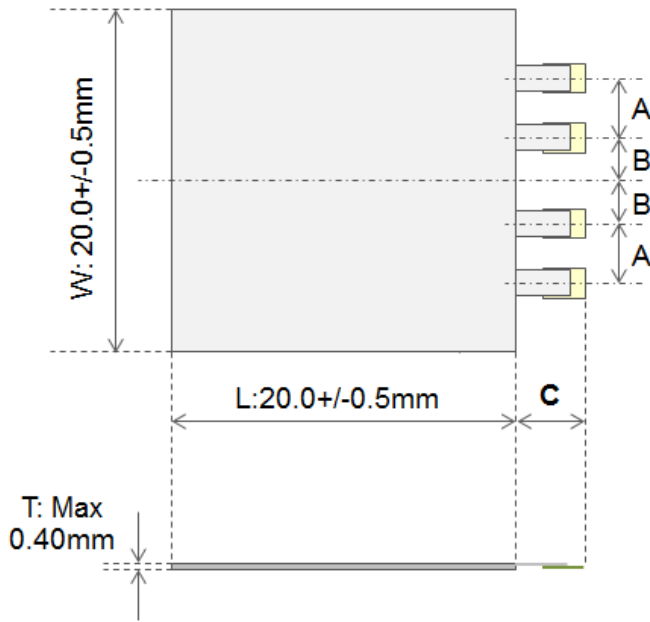
2. Part Number

2-1 Murata Part Number : DMHA14R5V353M4ATA0

2-2 Customer Part Number :

2-3 Customer Specification Number :

3. Appearance / Dimensions

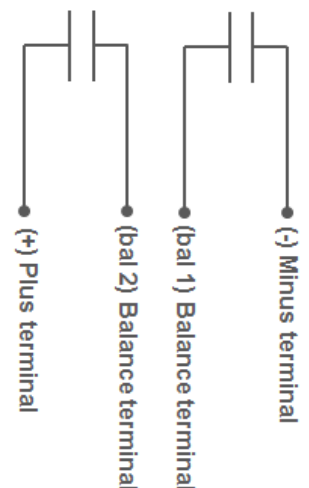
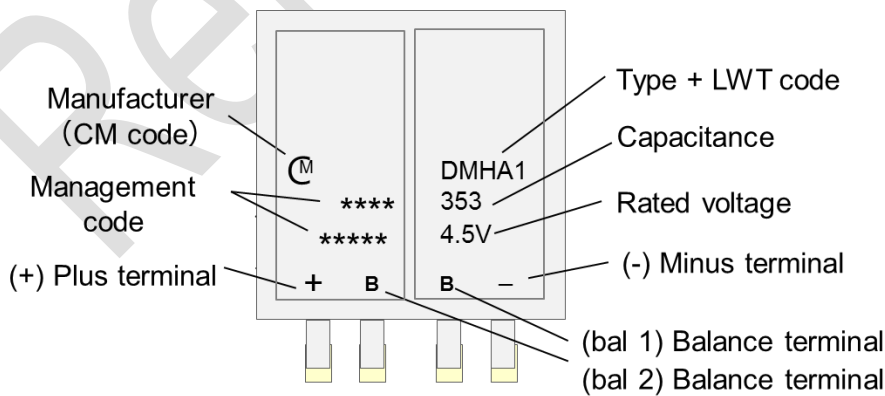


A=3.5 +/- 0.5mm
B=2.5 +/- 0.5mm
C=4.0 +/- 0.4mm
D=1.7 +/- 0.2mm
E=2.4 +/- 0.5mm
(E: Length of area in contact with a substrate)

<Product overall view>

<Terminal view>

4. Marking



(*) Balance terminal is used for balance control. Balance control is necessary for this product. For details, please see section 10.3(1).

5. Rated Value

This product is consisted of two capacitors. The rated values of each capacitor are as shown below.

Rated Voltage	Capacitance @25°C	ESR ^(*) @1kHz 25°C	Max. Discharge Current	Operating Temp. Range	Storage Temp. Range
2.25V	70mF +/-20%	150mΩ (200mΩMax)	5A	-40°C~+85°C	-40°C~+85°C

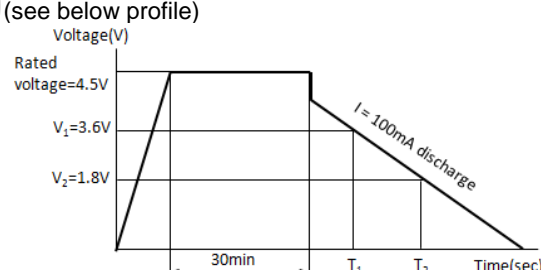
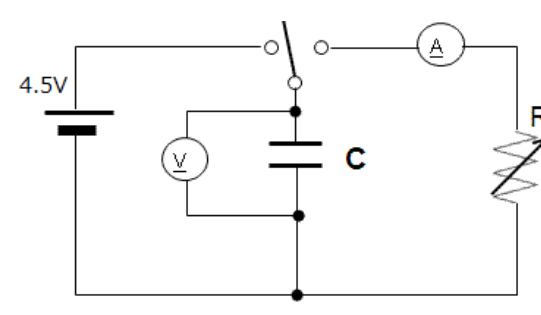
The rated value and characteristics of this product are specified under the condition that the balance terminals of two capacitors (bal1 and bal2) are connected in series

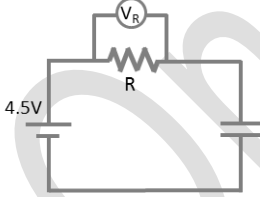
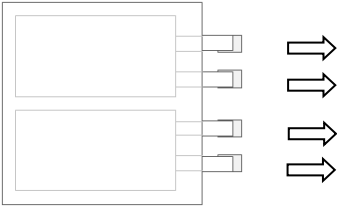
Part Number	Rated Voltage	Operating Voltage Range ^(*)	Capacitance @25°C	ESR ^(*) @1kHz 25°C	Max. Discharge Current	Operating Temp. Range	Storage Temp. Range
DMHA14R5V353M4ATA0	4.5V	0~4.5V	35mF +/-20%	300mΩ (400mΩMax)	5A	-40°C~+85°C	-40°C~+85°C

Note1 : ^(*) Please refer to Section 10.3 for cautions related to voltage, such as balance control.

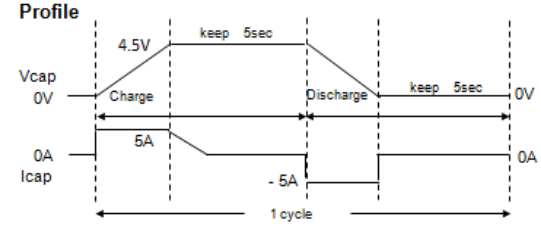
Note2 : ^(*) Please refer to Section 6-6 for temperature characteristics of capacitance and ESR.

6. Characteristics

No	Item	Characteristics	Test Conditions
1	Appearance	No remarkable damage, dirt or deformation	Visual
2	Dimensions	See Section 3	Microscope with length measuring function, or vernier caliper Thickness is measured with placing a capacitor between flat plates and applying 2kg weight
3	Capacitance	The value of Section 5 is satisfied.	Measurement method: four-terminal method Measurement temperature: 25+/-2°C Charge capacitor for 30min at 4.5V, then discharge. Charge current: 100mA (see below profile)  V1: 80% of 4.5V V2: 40% of 4.5V T1: Time with voltage V1 T2: Time with voltage V2 I : Discharge current: 100mA <Applying Formula> $C = \frac{I \times (T_2 - T_1)}{V_1 - V_2}$ <Test Circuit> 

No	Item	Characteristics	Test Conditions																				
4	ESR	The value of Section 5 is satisfied.	<Impedance Method> Measurement method: four-terminal method Measurement temperature: 25+/-2°C Measured at AC1kHz. Charge current:10-200mA																				
5	Leakage Current	60uA max	Measurement temperature: 25+/-2°C Charge voltage: 4.5V Charge time: 30 min. Measure the current value after charged by the above condition. The current value can also be calculated by measuring the voltage of protective resistance <Test circuit> 																				
6	Temperature Characteristics	Capacitance <table border="1" data-bbox="336 882 887 1037"> <thead> <tr> <th>Temperature(°C)</th> <th>Change @25°C</th> </tr> </thead> <tbody> <tr> <td>85 (Max.)</td> <td>+10/-0%</td> </tr> <tr> <td>40(Ref.)</td> <td>+10/-0%</td> </tr> <tr> <td>25</td> <td>Standard value</td> </tr> <tr> <td>-40 (Min.)</td> <td>-30% Min.</td> </tr> </tbody> </table> ESR(@ 1kHz) <table border="1" data-bbox="336 1093 887 1247"> <thead> <tr> <th>Temperature(°C)</th> <th>Change @25°C</th> </tr> </thead> <tbody> <tr> <td>85 (Max.)</td> <td>Less than standard value</td> </tr> <tr> <td>40(Ref.)</td> <td>Less than standard value</td> </tr> <tr> <td>25</td> <td>Standard value</td> </tr> <tr> <td>-40 (Min.)</td> <td>+500% Max.</td> </tr> </tbody> </table>	Temperature(°C)	Change @25°C	85 (Max.)	+10/-0%	40(Ref.)	+10/-0%	25	Standard value	-40 (Min.)	-30% Min.	Temperature(°C)	Change @25°C	85 (Max.)	Less than standard value	40(Ref.)	Less than standard value	25	Standard value	-40 (Min.)	+500% Max.	Temperature setting value +/- 2°C. Capacitance measured with discharge method is specified in Section 6.3. ESR measured with AC 1kHz is specified in Section 6.4. (Temperature switch : after 30 min at each temperature)
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7	Terminal strength	No break or crack on any terminal.	 Hold the body and pull terminal by tension tester (pulling strength 2N). No charge required. Temperature: 25°C																				
8	Vibration Resistance	<table border="1" data-bbox="336 1738 874 1986"> <thead> <tr> <th>Item</th> <th>Specification</th> </tr> </thead> <tbody> <tr> <td>Capacitance</td> <td>-30% of initial value</td> </tr> <tr> <td>ESR</td> <td>+100% of initial value</td> </tr> <tr> <td>Leakage current</td> <td>+150% of initial value</td> </tr> <tr> <td>Thickness @25°C</td> <td>0.5mm max</td> </tr> <tr> <td>Appearance</td> <td>No abnormality and No electrolyte leakage.</td> </tr> </tbody> </table>	Item	Specification	Capacitance	-30% of initial value	ESR	+100% of initial value	Leakage current	+150% of initial value	Thickness @25°C	0.5mm max	Appearance	No abnormality and No electrolyte leakage.	Charge up to 4.5V with 500mA and keep it for 30min. prior to measurement. Vibration : 10~500Hz/10G Amplitude : 1.5mm max, 1 octave/min 10 times/ Z(thickness) direction 10 times/ X, Y and Z directions Sweep time : LOG 11mins /direction Fix on substrate by double-stick tape so that vibration stress is applied to the inside of the capacitor package. Double stick tape : Nitto Denko Corp No.5000NS 10.0x7.0mm Characteristics are measured at 25°C, normal humidity.								
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No	Item	Characteristics	Test Conditions																		
9	Solder Wettability	Min 75% of terminal electrode should be covered by new solder.	Pre-treatment : No charge required. PCT105°C/Relative humidity 100%/ 1.22x10 ⁵ Pa for 4 hours Immersion depth (flux and solder): Up to 1.0~2.0mm from terminal head. Solder temperature: 245+/-3°C Sn-3Ag-0.5Cu Immersing time : 2~3 sec Immersing speed : 25+/-2.5mm/s																		
10	Solder Heat Resistance	<table border="1"> <thead> <tr> <th>Item</th> <th>Specification</th> </tr> </thead> <tbody> <tr> <td>Capacitance</td> <td>-30% of initial value</td> </tr> <tr> <td>ESR</td> <td>+100% of initial value</td> </tr> <tr> <td>Leakage current</td> <td>+150% of initial value</td> </tr> <tr> <td>Thickness @25°C</td> <td>0.5mm max</td> </tr> <tr> <td>Appearance</td> <td>No abnormality and No electrolyte leakage.</td> </tr> </tbody> </table>	Item	Specification	Capacitance	-30% of initial value	ESR	+100% of initial value	Leakage current	+150% of initial value	Thickness @25°C	0.5mm max	Appearance	No abnormality and No electrolyte leakage.	Pre-treatment: No charge required. Soldering Iron: 70W (typ.) Soldering Tip : φ0.8mm Exposed Length: 3mm, Solder Type: Resin flux cored solder wire (φ1.2mm typ.) Solder: Lead-free solder: Sn-3Ag-0.5Cu Test Condition: Soldering Tip Temperature: 350+/-10°C Heating duration: 3.0+0/-1 sec / one terminal Test Method: *Position the soldering iron parallel to the test spot of terminal. *Avoid contact of soldering tip with capacitor body.						
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No	Item	Characteristics	Test Conditions
14	Moisture Resistance	Items	Specification
		Capacitance	-30% of initial value
		ESR	+100% of initial value
		Leakage current	+150% of initial value
		Thickness @25°C	0.5mm max
		Appearance	No abnormality and No electrolyte leakage.
			Voltage: DC 4.5 +0/-0.1 V Temperature: 40+/-3°C Humidity: 90-95% Duration: 1000+24 /-0hrs Charge up to test voltage with 500mA and keep it for 30min. prior to measurement. Characteristics are measured at 25°C. Allow device to sit for 2hrs min at 25°C prior to measurement. Connect two balance resistors (10kΩ or less) in parallel with each capacitor.
15	Charge/ Discharge Cycle Test	Items	Specification
		Capacitance	-30% of initial value
		ESR	+100% of initial value
		Leakage current	+150% of initial value
		Thickness @25°C	0.5mm max
		Appearance	No abnormality and No electrolyte leakage.
			Charge voltage: DC4.5 +0/-0.1V Temperature : 25 +/-2 °C Current:5A Test cycle : 50,000 cycles Profile  Allow device to sit for 2hrs min at 25°C prior to measurement.

7. Safety Test⁽³⁾

No	Item	Specification	Test Condition
1	Puncture	No venting, fire or explosion	Pretreatment: Charge up to 4.5V with 500mA and keep it for 30min.prior to measurement. Fully penetrate the center of capacitor by a 2.5φ needle. Temperature: 85°C
2	Compression	No fire or explosion	Pretreatment: Charge up to 4.5V with 500mA and keep it for 30min.prior to measurement at 25°C. Apply pressure on capacitor up to13kN (Both sides of capacitor) Temperature: 25°C
3	External Short Circuit	No fire or explosion	Pretreatment: After applying UL810A compliant process ⁽⁴⁾ , charge up to 4.5V with 500mA and keep it for 30min.prior to measurement. Connect positive and negative terminals to external resistance of 5mΩ or less in order to short circuit capacitor Temperature: 55°C
4	Heating	No fire or explosion	Pretreatment: Charge up to 4.5V with 500mA and keep it for 30min.prior to measurement at 25°C. Allow capacitor to sit at 130°C for 10 minutes.

⁽³⁾This product received safety standard, UL 810A certification.

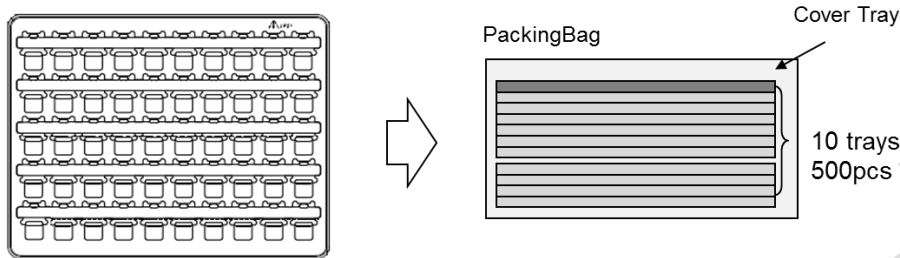
⁽⁴⁾ UL810A Compliant preprocess

Preprocess item	Condition	Time
Charge/discharge cycle	Charge up to 4.5V with 10A and keep it for 15sec. Discharge to 0V with 10A and keep it for 30sec	500hrs
Temperature cycle	Raise the temperature up to 70°C within 30 min. and keep it for 4hrs. Lower the temperature to 20°C and keep it for 2hrs. Then lower to -40°C and keep it for 4hrs. Raise to 20°C and keep it for 30min.	1cycle
High temperature storage	Maximum storage temperature +10°C	168hrs

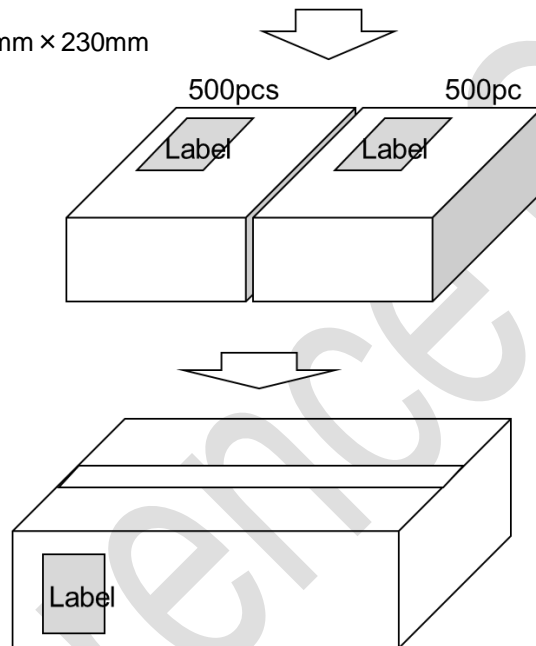
8. Packaging and Minimum order quantity

Package type	Minimum order quantity
tray(50pcs/ tray)	500pcs

Tray (50pcs / Tray)



Tray dimension (LxW): 300mm x 230mm



9. Quality Assurance

- (1) Murata's responsibility for the quality of this product shall be limited to those specified in this document.
- (2) It is a customer's responsibility to judge fitness of this product for assembly process, end use and operating environment.
- (3) Please keep product in sealed packing bag before use.

10. Caution for Use

⚠ Caution

10.1 Limitation of applications

Please contact us before using our products for the applications listed below which may require especially high reliability for the prevention of defects which might directly cause damage to the end-users' life, body or property.

- ①Aircraft equipment ②Aerospace equipment ③Undersea equipment
- ④Power plant control equipment ⑤Medical equipment
- ⑥Transportation equipment(vehicles, trains, ships, etc.) ⑦Traffic signal equipment
- ⑧Disaster prevention / crime prevention equipment ⑨Data-processing equipment
- ⑩Application of similar complexity and/or reliability requirements to the applications listed in the above.

Please do not use this product for any applications related to the followings.

- ①Military equipment

⚠ Caution

10.2 Storage condition

10.2.1 Term of warranty for this product is one year after packaging, under the conditions below with sealed packing bag.

Recommended storage environment :Room temperature: 30 °C

Humidity : No more than 60%RH

This product cannot be baked.

10.2.2 Storage conditions after opening packing bag.

(1) Term of warranty of this product is 3 months after opening sealed packing bag.

(2) Please keep product under the following conditions in sealed packing bag.

Temperature: 5-35°C

Humidity: No more than 70%RH. No condensation.

Avoid any acidic or alkaline environment.

Avoid excessive external force on this product while in storage.

(3)Please keep product in sealed packing bag before use.

⚠ Caution

10.3. Cautions for design

(1) Voltage balance control

This product consists of two individual cells connected electrically. When in use, please be sure to control the voltage of each cell and keep capacitor voltage within operating voltage range(0~4.5V). Balance control is needed in order to prevent the excessive voltage (over 1/2 voltage of applied voltage) being applied to either cell. Excessive voltage of either cell may shorten the lifetime of capacitor, distort the capacitor shape or cause electrolyte leakage.

There are an active balance control and a passive balance control by balance resistor. For more details, please contact us.

(2)Polarity

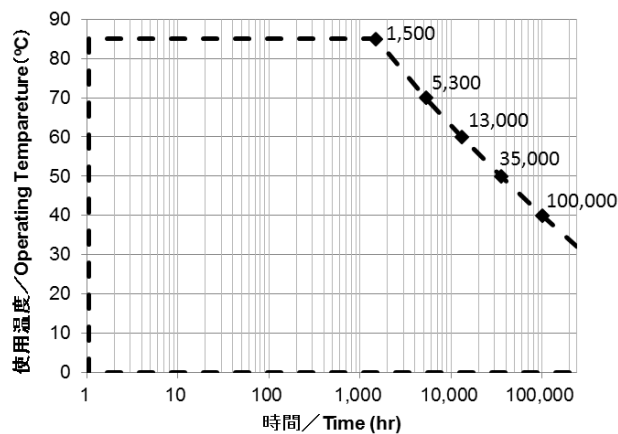
This product has polarity. Please do not reverse polarity when in use. Reverse polarity may damage electrolyte or the electrode inside. Please verify the orientation of the capacitor before use in accordance with the Markings of polarity on the product. For marking details, please refer to Section 4 “Markings”.

(3) Considerations for operation on AC

When using this product on AC, not only the effective voltage but also peak voltage should be within operating voltage range(0~4.5V).

(4) Limited operating life

Please use this product keeping the voltage and operating time within the specified limit by temperature as shown below (within a dotted line). If going beyond the limit, it may cause product failure.



(5) Bulge

This product may bulge according to surrounding temperature or applied voltage.

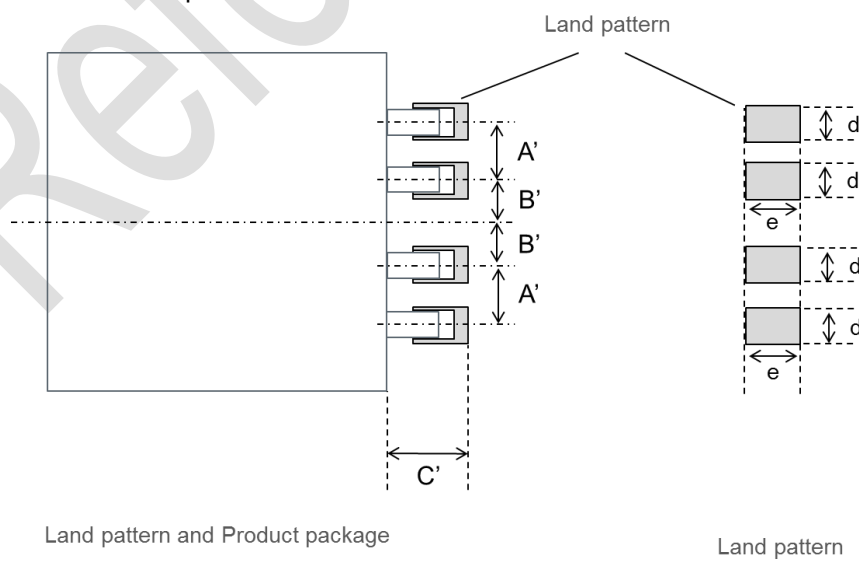
Please contact us if you need detailed information about bulge under your use conditions.

- (6) Self heating temperature
When repeating charge and discharge in a short cycle, self heating is generated by internal resistance. The product temperature should not exceed 85°C, including any self heating.
- (7) The capacitor package is covered by insulation layer. In some part, however, metal is exposed. Please keep this product from coming in contact with other device or circuit.
- (8) This product cannot be used under any acidic or alkaline environment.
- (9) At extremely low pressure, this product may not be able to provide expected performance. If you would like to use this product at low pressure environment continuously, please consult us first.

⚠Caution

10.4. Soldering and assembling


- (1) Reflow and flow soldering cannot be used because a capacitor body temperature will rise beyond maximum allowable temperature. Please use other mounting methods. These may include hand soldering, etc.
If detailed information about other methods such as hot bar soldering and ACF bonding, which are not specified in this specification, please contact us.
- (2) Please do not apply excessive force to the capacitor during insertion as well as after soldering. The excessive force may result in damage to electrode terminals and/or degradation of electrical performance.
- (3) Manual soldering
The following conditions are recommended;
Solder type: Resin flux cored solder wire (φ1.2mm)
Solder: lead-free solder: Sn-3Ag-0.5Cu
Soldering iron temperature at 350 °C+/-10 °C
Solder iron wattage: 70W max.
Soldering time: 3 sec maximum per one terminal
Allowable soldering frequencies: 3 times maximum per one terminal.
Allowable cumulative soldering time per capacitor: 15 sec max total.
Please do not touch laminate package directly by solder iron.
In order to ensure the connectivity, please apply preparatory solder on the land.
When soldering, please apply flux or flux solder, heating the preparatory solder.
- (4) Applying thermal stress by spot heater or soldering iron to the capacitor or surrounding devices may result in electrical characteristics degradation. Please be careful not to apply thermal stress to the capacitor when repairing.
- (5) Recommended land pattern



A': 3.5
B': 2.5
C': 4.6
d: 2.9
e: 3.0

Unit: (mm)

- (6) Please do not wash the device after soldering.

 Caution

10.5 Fixing product

If mechanical stress can be applied on a product due to drop or vibration, please fix products by resin coating or double-sided tape. If you have any questions or problems about product fixing, please contact us.

(1) Resin coating

If coating/molding the device with resin, there is a risk that some resins may erode metal, or cure-stress of resin may distort terminal or package shape. So please pay careful attention in selecting resin.

Prior to use, please make the reliability evaluation with the device mounted in your application set.

(2) Fixing on substrate with double-sided tape

When fixing product on substrate using double-sided tape, please do not overstress the package. Strong press may distort terminal or package shape.

Removing fixed device from substrate may detach device and tape, or distort terminal or package shape. Please do not use sharp tools when removing device from substrate.

 Caution

10.6 Markings

Contact of organic solvent (such as IPA) or removing double sided tape from the capacitor marking area (see Section 4) may erase markings on the device. If sequence number is erased, it will prevent us from tracking manufacturing record. Please be careful not to erase markings on the device.

 Caution

10.7 Disassembly

Please do not disassemble this product. It may cause electrolyte leakage or failure.

 Caution

10.8 Disposal

This device should be disposed of as industrial waste in accordance with local laws and regulations. Never throw this device into fire.

 Caution

10.9 Response to IATA Dangerous Goods Regulations

An energy storage capacity of each Murata's supercapacitor is not greater than 0.3Wh. Therefore, Murata's supercapacitors are not covered by 54th Edition of IATA Dangerous Goods Regulations effective from January 1, 2013.

11. Proposal

- (1) When you use, please evaluate in a state mounted by your product
- (2) Please do not use this product other than the mentioned contents of this specification.
- (3) Please return one duplicate of this product specification to us with your signature to acknowledge your receipt. If the duplicate is not returned by appointed day (YYYY/MM/DD), the product specification will be deemed to have been received by you.
- (4) We consider it is not appropriate to include any terms and conditions with regard to the business transaction in the product specifications, drawings or other technical documents. Therefore, if your technical documents as above include such terms and conditions such as warranty clause, product liability clause, intellectual property infringement liability clause, or export control clause, they will be deemed to be invalid.