

Specification No. JECXDE-0008

To Mouser Electronics, Inc.

SPECIFICATION

Date : Apr. 3, 2012

Product Description : Electrical Double Layer Capacitor

Customer Part Number :

Murata Part Number : DMD2W4R2L354M3BTA0

Stamp or signature for receipt		
We received this documents		
/ /		
Company Name _____		
Section Name _____		
Mgr		Eng.

Issue Section
Company Name

Mgr. Atsushi Kawashima

Murata Manufacturing Co., Ltd.

High Performance Power Device Dept.

Eng. Kunio Nomura

Sales Section

Mgr.

Murata Manufacturing Co., Ltd.

Specification of Electrical Double Layer Capacitor

1. Scope

These specifications are applicable for Electrical Double Layer Capacitor (EDLC) for consumer electronic equipments. For other markets and applications please contact your local Murata sales or engineering representative. This specification outlines detailed information for double cell EDLC for Back up applications. For use under different conditions within the scope of these specifications, please consult a Murata sales or engineering representative.

2. Part Number Description

DMD □□ □□□ □ □□□ □ □□ □ □□

(1) (2) (3) (4) (5) (6) (7) (8) (9)

Number	Name	Code ex.	Specification																		
(1)	Series	DMD	>Thin laminate type > Operating temperature: -30deg C~70 deg C As shown below, please use this device within a specified period at each temperature 40 deg C,4.2V: 37,000hrs 50 deg C,4.2V: 15,000hrs 60 deg C,4.2V: 6,600hrs 70 deg C,4.2V: 3,000hrs > Storage temperature: -30deg C~85 deg C > Rated voltage: 4.2V																		
(2)	Dimensions	2W	<table border="1"> <thead> <tr> <th rowspan="2">Code</th> <th rowspan="2">LW</th> <th colspan="3">T (mm)</th> </tr> <tr> <th colspan="2">@ 25DegC</th> <th>@85DegC</th> </tr> <tr> <td></td> <td></td> <th>Initial</th> <th>T max @ End life</th> <th>T max at 168hr</th> </tr> </thead> <tbody> <tr> <td>2W</td> <td>L: 20.5+/-0.5mm W:18.5+/-0.5mm</td> <td>3.0+0.3/-0.3</td> <td>0.1mm thicker than initial</td> <td>0.2mm thicker than initial</td> </tr> </tbody> </table> T: Measured by 10mmΦplate with 0.9N. Details shown in section 5.	Code	LW	T (mm)			@ 25DegC		@85DegC			Initial	T max @ End life	T max at 168hr	2W	L: 20.5+/-0.5mm W:18.5+/-0.5mm	3.0+0.3/-0.3	0.1mm thicker than initial	0.2mm thicker than initial
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(3)	Rated voltage	4R2	4.20V: Continuous loading voltage *Definition of rated voltage 4.20V for 8000hrs at 40degC.(ESR: 140% of initial, Cap: 70% of initial) * Reference *4.20V for 1000hrs at 70degC(Reference) *4.00V for 32000hrs at 40degC(est)																		
(4)	ESR	L	<table border="1"> <thead> <tr> <th>Code</th> <th>Initial ESR @ 1kHz (m Ohm) @25degC</th> </tr> </thead> <tbody> <tr> <td>L</td> <td>60 +/- 10mohm</td> </tr> </tbody> </table>	Code	Initial ESR @ 1kHz (m Ohm) @25degC	L	60 +/- 10mohm														
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(5)	Nominal Capacitance	354	<table border="1"> <thead> <tr> <th>Code</th> <th>Capacitance</th> </tr> </thead> <tbody> <tr> <td>354</td> <td>350mF(35 × 10⁴ uF)</td> </tr> </tbody> </table>	Code	Capacitance	354	350mF(35 × 10 ⁴ uF)														
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354	350mF(35 × 10 ⁴ uF)																				
(6)	Cap Tolerance	M	M: +/-20%(Standard) , K: +/-10%																		
(7)	Terminal type	3B	Platinum plate: 3B Terminal pattern: Refer to mechanical drawing shown in section 5.																		
(8)	Package	T	T: Tray package Details shown in section 7.																		
(9)	In-house specification	A0	Standard: A0																		

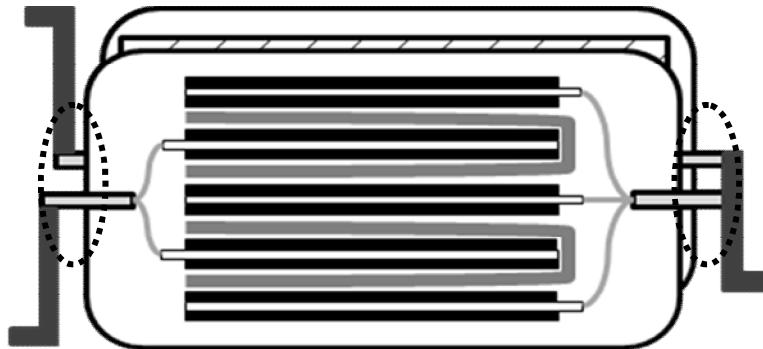
3. DMD type

Part Number	Rated Voltage (V)	ESR @1kHz @25deg C	Nominal Capacitance @25deg C	Dimensions(mm)			Leakage current Max @96hr
				L	W	T	
DMD2W4R2L354M3BTA0	4.2	60 +/-10.0 mohm	350mF +/-20%	20.5 +/-0.5	18.5 +/-0.5	3.0 +0.3/-0.3	10uA

T: Measured by 10mmΦplate with 0.9N.

*As for the temperature characteristics of ESR and capacitance, please refer to “8-8. Temperature characteristics”.

4. Products Structure



4-1. Electrolyte : Inside of 4-4-1.Laminate

4-2. Electrode : Consisting of 4-2-1. Al Foil and 4-2-2. Carbon

4-2-1. Al Foil :

4-2-2. Carbon :

4-3. Separator :

4-4. Outer Package : Consisting of 4-4-1. Laminate, 4-4-2. Withdraw terminal, and 4-4-3. Glue

4-4-1. Laminate :

4-4-2. Withdraw Terminal :

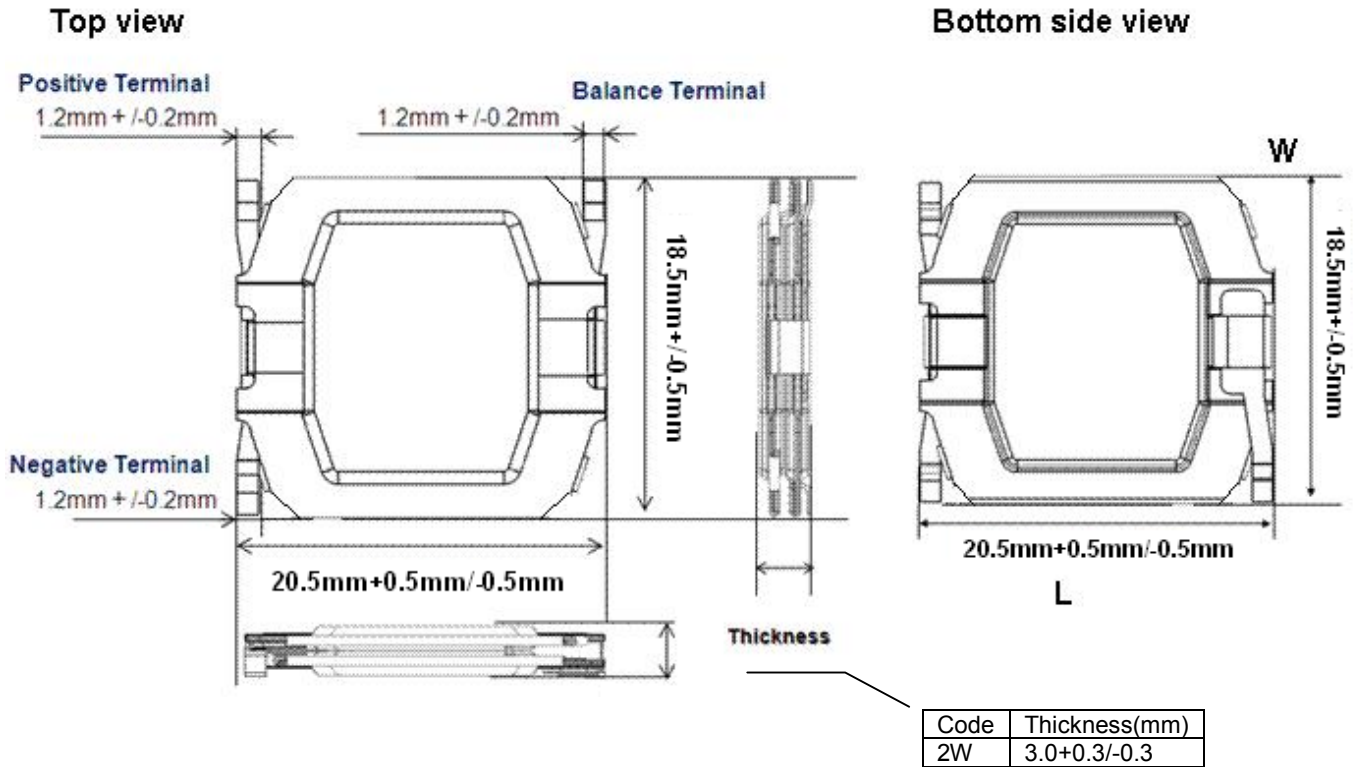
4-4-3. Glue (Moisture curing adhesive or UV curing adhesive) :

4-5. Double Side Adhesive Tape :

4-6. Outer Terminal :

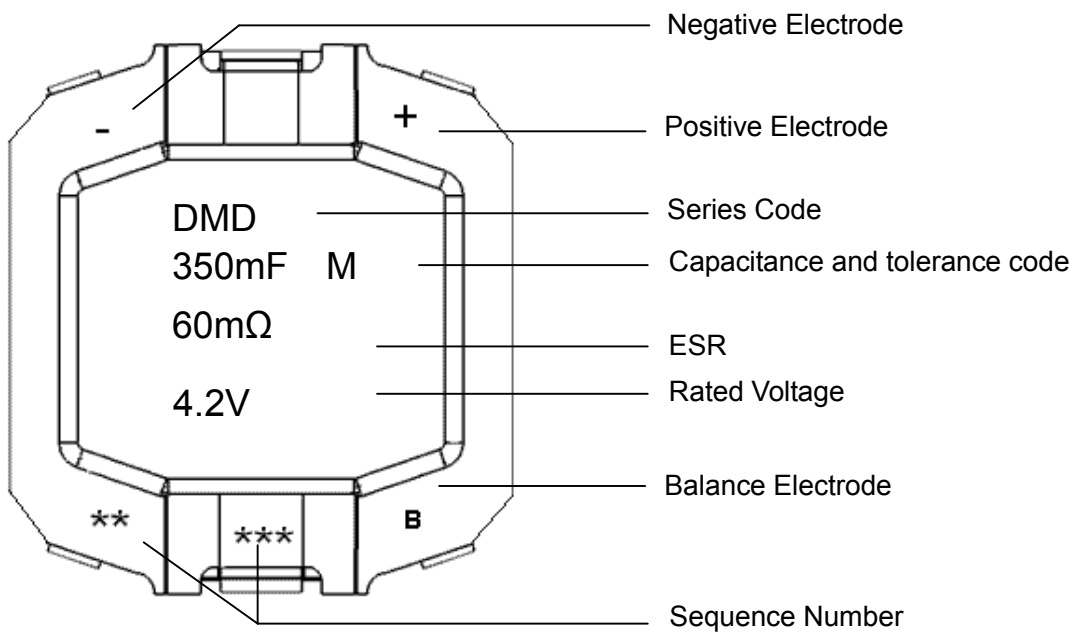
Specification of Electrical Double Layer Capacitor

5. Mechanical Drawing

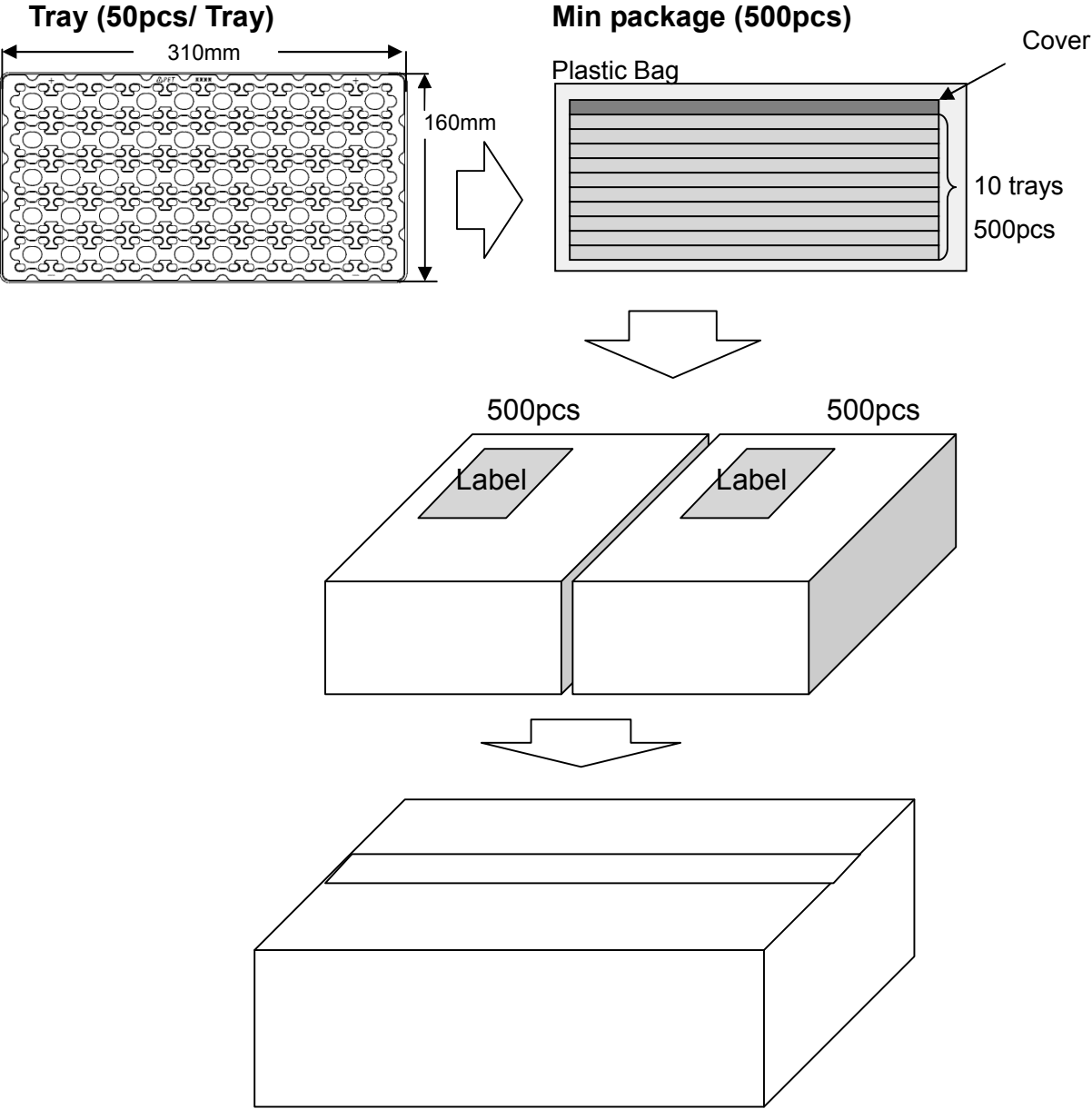


T: Measured by 10mmΦplate with 0.9N.

6. Marking



7. Packaging



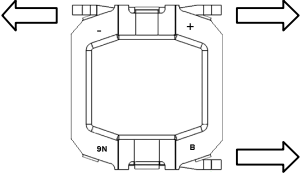
***Minimum Shipping Quantity: 500pcs**

Specification of Electrical Double Layer Capacitor

8. Performance

No	Item	Specification	Validation Method				
1	Operation Temperature	-30degC ~ +70degC					
2	Storage Temperature	-30degC ~ +85degC for 168hrs					
3	Appearance	No external abnormality	Visual				
4	Dimensions	Refer to section 3	Microscope, Vernier Caliper				
5	Nominal Capacitance	<table border="1"> <thead> <tr> <th>Code</th> <th>Capacitance</th> </tr> </thead> <tbody> <tr> <td>354</td> <td>350mF +/-20%</td> </tr> </tbody> </table>	Code	Capacitance	354	350mF +/-20%	<p>Discharge method</p> <ol style="list-style-type: none"> Charge capacitor for 30min at rated voltage 4.2V. Then discharge <p>V1: 80% of rated voltage V2: 40% of rated voltage T1: Time with voltage V1 T2: Time with voltage V2 Discharge current: 100mA</p> $C = \frac{I \times (T_2 - T_1)}{V_1 - V_2}$
Code	Capacitance						
354	350mF +/-20%						
6	ESR	<table border="1"> <thead> <tr> <th>Code</th> <th>Initial ESR @ 1kHz (m Ohm) @25°C</th> </tr> </thead> <tbody> <tr> <td>L</td> <td>60 +/- 10mohm</td> </tr> </tbody> </table>	Code	Initial ESR @ 1kHz (m Ohm) @25°C	L	60 +/- 10mohm	<p>Impedance Method Measure at AC1kHz. Current : 10mA- 200mA</p>
Code	Initial ESR @ 1kHz (m Ohm) @25°C						
L	60 +/- 10mohm						
7	Leakage current	Less than or equal to 10uA at 96hrs.					

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No	Item	Specification	Validation Method																												
8	Temperature characteristics	<p>Capacitance</p> <table border="1"> <thead> <tr> <th>Temperature (deg C)</th> <th>Capacitance change versus 25degC</th> </tr> </thead> <tbody> <tr> <td>70 (Max temp.)</td> <td>+/-10%</td> </tr> <tr> <td>40(Ref.)</td> <td>+/-10%</td> </tr> <tr> <td>25</td> <td>-</td> </tr> <tr> <td>0(Ref.)</td> <td>+/-10%</td> </tr> <tr> <td>-20(Ref.)</td> <td>+/-10%</td> </tr> <tr> <td>-30 (Min temp.)</td> <td>+/-10%</td> </tr> </tbody> </table> <p>ESR(@1kHz)</p> <table border="1"> <thead> <tr> <th>Temperature (deg C)</th> <th>ESR relative to initial value (mohm @ 1kHz)</th> </tr> </thead> <tbody> <tr> <td>70(Max temp.)</td> <td>+/-10%</td> </tr> <tr> <td>40(Ref)</td> <td>+/-10%</td> </tr> <tr> <td>25</td> <td>-</td> </tr> <tr> <td>0(Ref)</td> <td>+20% or less</td> </tr> <tr> <td>-20(Ref)</td> <td>+50% or less</td> </tr> <tr> <td>-30(Min temp.)</td> <td>+80% or less</td> </tr> </tbody> </table>	Temperature (deg C)	Capacitance change versus 25degC	70 (Max temp.)	+/-10%	40(Ref.)	+/-10%	25	-	0(Ref.)	+/-10%	-20(Ref.)	+/-10%	-30 (Min temp.)	+/-10%	Temperature (deg C)	ESR relative to initial value (mohm @ 1kHz)	70(Max temp.)	+/-10%	40(Ref)	+/-10%	25	-	0(Ref)	+20% or less	-20(Ref)	+50% or less	-30(Min temp.)	+80% or less	<p>Temperature setting value +/- 2degC. >Capacitance measuring with discharge method is specified in No. 5. >ESR measuring with AC 1kHz is specified in No. 6</p>
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9	Terminal strength	Every terminal tensile strength must be 1N or more.	 <p>Hold the capacitor body and pull terminal.</p>																												
10	Solder wettability	Min 75% of terminal electrode should be covered by new solder.	<p>Preprocessing condition: PCT105degC/Relative humidity 100%/1.22x10⁵Pa for 4 hours Immersion depth (flux and solder): Up to 0.8~1.2mm from terminal root. Solder temperature: 245+/-3degC. Sn-3Ag-0.5Cu Solder immersion time: 2~3 sec Duration: 25+/-2.5mm/s</p>																												
11	Solder heat resistance	<table border="1"> <thead> <tr> <th>Items</th> <th>Specification</th> </tr> </thead> <tbody> <tr> <td>Capacitance</td> <td>Satisfy initial value</td> </tr> <tr> <td>ESR</td> <td>Satisfy initial value</td> </tr> <tr> <td>Leakage current</td> <td>Satisfy initial value</td> </tr> <tr> <td>Dimensions</td> <td>Satisfy initial structure</td> </tr> <tr> <td>Appearance</td> <td>No abnormality and No electrolyte leakage.</td> </tr> </tbody> </table>	Items	Specification	Capacitance	Satisfy initial value	ESR	Satisfy initial value	Leakage current	Satisfy initial value	Dimensions	Satisfy initial structure	Appearance	No abnormality and No electrolyte leakage.	<p>Soldering iron: Wattage 70W(typical), Diameter of soldering tip: 0.8mm Exposed length: 3mm, Solder type: Resin flux cored solder wire(Nominal length 1.2mm) Solder: Lead-free solder: Sn-3Ag-0.5Cu Test condition: Soldering tip temperature: 350+/-10degC Heating duration: 3.0+1/-0 sec Test method: *Position the soldering iron parallel to the test spot of terminal *Avoid contact of soldering tip with capacitor body.</p>																
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13	Temperature cycle.	<p>Temperature Range: -30degC to +85degC Test Cycles: 256 cycles *Without charging.</p> <table border="1"> <thead> <tr> <th>Items</th> <th>Specification</th> </tr> </thead> <tbody> <tr> <td>Capacitance</td> <td>-20% of initial value</td> </tr> <tr> <td>ESR</td> <td>+20% of initial value</td> </tr> <tr> <td>Leakage current</td> <td>Satisfy initial value</td> </tr> <tr> <td>Appearance</td> <td>No abnormality and No electrolyte leakage.</td> </tr> </tbody> </table>	Items	Specification	Capacitance	-20% of initial value	ESR	+20% of initial value	Leakage current	Satisfy initial value	Appearance	No abnormality and No electrolyte leakage.	<p>Temperature Cycle</p> <table border="1"> <thead> <tr> <th></th> <th>Temperature</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Room Temperature 25+/-2degC</td> </tr> <tr> <td>2</td> <td>-30+/-2degC</td> </tr> <tr> <td>3</td> <td>Room Temperature 25+/-2degC</td> </tr> <tr> <td>4</td> <td>85+/-2degC</td> </tr> <tr> <td>5</td> <td>Room Temperature 25+/-2degC</td> </tr> </tbody> </table> <p>*Test should be done without charging. *Measure characteristics at 25degC.</p>		Temperature	1	Room Temperature 25+/-2degC	2	-30+/-2degC	3	Room Temperature 25+/-2degC	4	85+/-2degC	5	Room Temperature 25+/-2degC
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14	Storage at High temperature.	<table border="1"> <thead> <tr> <th>Items</th> <th>Specification</th> </tr> </thead> <tbody> <tr> <td>Capacitance</td> <td>-20% of initial value</td> </tr> <tr> <td>ESR</td> <td>+20% of initial value</td> </tr> <tr> <td>Leakage current</td> <td>Satisfy initial value</td> </tr> <tr> <td>Thickness @25degC</td> <td>0.1mm thicker than initial thickness</td> </tr> <tr> <td>Thickness @85degC</td> <td>0.2mm thicker than initial thickness.</td> </tr> <tr> <td>Appearance</td> <td>No abnormality and No electrolyte leakage.</td> </tr> </tbody> </table>	Items	Specification	Capacitance	-20% of initial value	ESR	+20% of initial value	Leakage current	Satisfy initial value	Thickness @25degC	0.1mm thicker than initial thickness	Thickness @85degC	0.2mm thicker than initial thickness.	Appearance	No abnormality and No electrolyte leakage.	<p>Temperature: 85+0/-3degC Duration: 168hrs+3/0hrs *Without charging *Measure characteristics at 25degC. *Keep device for 2hrs or more at 25degC before measuring.</p>								
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No	Item	Specification	Validation Method												
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Capacitance	Satisfy initial value														
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Items	Specification														
Capacitance	-20% of initial value														
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18	Charge-Discharge Cycle Test	<table border="1"> <thead> <tr> <th>Items</th> <th>Specification</th> </tr> </thead> <tbody> <tr> <td>Capacitance</td> <td>+/-50% of initial value</td> </tr> <tr> <td>ESR</td> <td>+100% of initial value</td> </tr> <tr> <td>Leakage current</td> <td>Satisfy initial value</td> </tr> <tr> <td>Thickness @25degC</td> <td>0.1mm thicker than initial thickness.</td> </tr> <tr> <td>Appearance</td> <td>No abnormality and No electrolyte leakage.</td> </tr> </tbody> </table>	Items	Specification	Capacitance	+/-50% of initial value	ESR	+100% of initial value	Leakage current	Satisfy initial value	Thickness @25degC	0.1mm thicker than initial thickness.	Appearance	No abnormality and No electrolyte leakage.	Charge voltage: $4.2 +0/-0.1\text{V}$ Temp.: $25 +/-2\text{ degC}$ Current: $5.0+0/-0.1\text{A}$ Cycle number: 50000 Profile <p>The graph shows the voltage (V_{cap}) and current (I_{cap}) profiles for one cycle. The voltage starts at 0V, rises linearly to 4.2V during the 'Charge' phase with a current of 5A. It then remains constant at 4.2V for 'keep 0.1sec'. The voltage then falls linearly to 0V during the 'Discharge' phase with a current of -5A. It remains constant at 0V for another 'keep 0.1sec' period. The current is 0A throughout the keep phases. The total duration of one cycle is indicated as '1 cycle'.</p>
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Capacitance	+/-50% of initial value														
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9. Safety Test Specification

No	Item	Specification	Validation Method
1	Puncture	No smoke, ignition or rupture	Preprocessing: Charge up to rated voltage at 25degC. Fully penetrate the center of capacitor by a 2.5φ needle. Temperature: 60degC
2	Compression	No smoke, ignition or rupture	Preprocessing: 1. Charge device to rated voltage at 25degC. 2. Press the center of the capacitor with 10φ round bar and bend it at 90 degrees.(X and Y directions, Both sides) at 60+/-2deg C.
3	External Short Circuit	No leakage, smoke, ignition or rupture	Preprocessing: Charge up device to rated voltage at 25degC Connect plus and minus terminals by external resistance of 80+/- 20mohm. Temperature: 60degC.
4	Heating	No smoke, No ignition.	Preprocessing: Charge up to rated voltage at 25degC. Allow capacitor to sit at 150degC for 3 hours
5	Static Electricity Test (ESD)	No leakage, smoke, ignition or rupture	<HBM>C=150pF, R=150ohm, 1kV, 10 times Test Object: balance terminal, plus terminal, upper and under sides of package Temperature: 25degC

10. Quality Assurance

- (1) Murata's responsibility for the quality of this product shall be limited to the specifications and usage as stated in this document.
- (2) The customer should evaluate and decide on the right type of assembly process and operating conditions/environment for this product.
- (3) Please keep device in sealed plastic package before use.

11. CAUTION

11.1. Limitation of Usage

This product is designed for standard consumer applications. For the following high reliability applications, please contact Murata beforehand to discuss limitations and restrictions. Wrongful use of this product could lead to malfunction and harm to human life or property.

- (1)Aviation machinery (2) Space machinery (3) Undersea machinery
- (4)Power plant control equipment (5)Transportation equipment (car, train, ship...etc.,)
- (6)Signal machinery for traffic (7)Disaster prevention/crime prevention machinery
- (8)Data processing machinery (9)Other equivalent machinery

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

- (1)Military equipment (2) Medical Equipment

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11.2. STORAGE CONDITIONS

11.2.1 Storage Condition without opening outer package.
 30degC 60%RH for 1 year (Before opening outer package)
 *Remark: This product cannot be baked.

11.2.2 Storage conditions after opening outer package.
 (1)Term of warranty of this device is 3 months after opening sealed package.
 (2)Storage environment
 Please keep device under the following conditions in sealed package.
 Temperature: 5-35 deg C and
 Humidity: no more than 70%RH. No condensation.
 Avoid any acidic or alkaline environment.
 Avoid excessive external force on this device while in storage.
 (3)Please keep device in sealed plastic package before use
 (4)Please do not apply any heat treatment before use.

11.3. CAUTION BEFORE USAGE

- (1) Rated voltage
 This device must be used within rated voltage. In case over voltage, electrolyte leakage or swelling may occur.
 This device has two individual cells connected electrically in series. Please make sure that peak voltage is less than 2.75V per cell and less than 2.1V per cell for constant load.
- (2)Balance control
 When connecting 2 or more capacitors in series (This device itself consists of two individual capacitors connected electrically in series.), please make sure to control voltage balance of each capacitor for the following two purposes;
 - To prevent overvoltage: Prevent excessive voltage from being applied to any capacitor
 - To prevent shortening of the life time: By making capacitor voltage equal, variation in the rate of degradation can be controlled. It allows long-term use of capacitors.

<Recommended balance condition>

	Discharge Frequency of capacitor (Under the condition of power-off (fully discharged) or discharged under 0.5V)				Discharge at under 0.3V (Battery assist)
	under 10 times	10-100times	100-500 times	500times or more	
2.1V/cell	220kΩ or less	220kΩ or less	10kΩ or less	10kΩ or less	220kΩ or less
1.8-2.1V/cell	220kΩ or less	220kΩ or less	22kΩ or less	22kΩ or less	220kΩ or less
under1.8V/cell	Please consult a Murata representative				

Supposed condition: Temperature is always under 40degC. Within five years
 (Supposed degradation rate;
 Capacitance decrease: up to 30%, ESR increase: up to 50%)
 If using capacitor always at over 40degC, please consult a Murata representative.

Specification of Electrical Double Layer Capacitor

(3) Applicable wave form

Fig 1. Permitted loading.

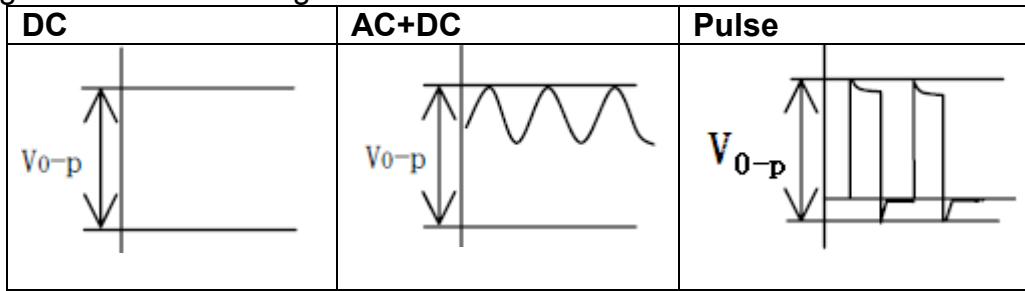
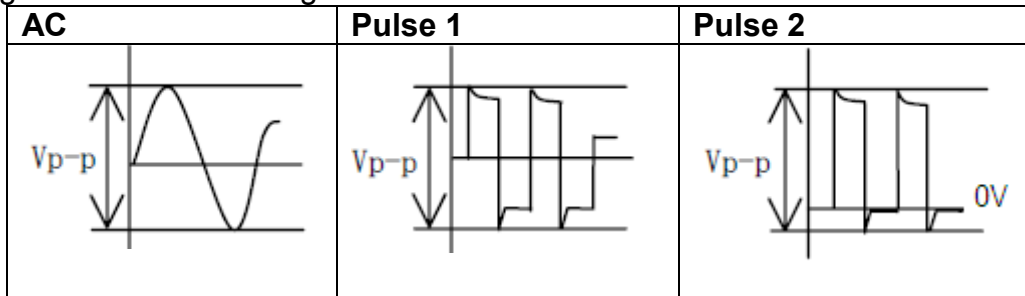


Fig 2. Restricted loading.



<Polarity>

This device 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 products.

(4). Self heating temperature

The product temperature should not exceed 70degC, including any self heating due to high currents and ESR (ohmic losses). When measuring temperature, a $\varnothing 0.1\text{mm}$ type K thermocouple of low heat capacity is recommended. Self heating temperature should be measured under no radiation heat from tabs and wind-free condition. Excessive heating may decrease the reliability of the product or damage it irreversibly.

(5). If a capacitor body contacts with other part or circuit, it may cause leakage failure.

(6). This device cannot be used under any acidic or alkaline environment.

(7). This device uses a relatively low vapor pressure liquid electrolyte. At high altitudes (low external pressure), internal resistance or other performance may be decreased. If you would like to use this product at high altitude continuously, please consult a Murata representative first.

11.4. CAUTION for Soldering and Assembling

(1) These parts should not be soldered using Re-Flow and Flow profiles. Please use connection methods which prevent the main body of the parts rising beyond maximum allowable temperature. These may include hand soldering, Ultrasonic welding, etc

(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.

Specification of Electrical Double Layer Capacitor

(3) Hand Soldering

Please solder under following conditions.

Soldering iron temperature at 350degC +/-10degC

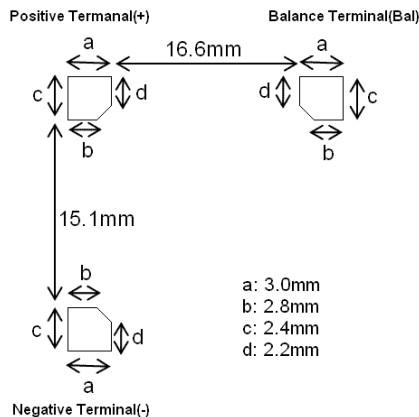
Solder Iron wattage: 70W or less

Soldering time: 3.0+1/-0sec

Allowable soldering frequencies: 3 times /device. * Please allow at least for 15 sec between successive soldering.

Please do not touch laminate package directly by solder iron.

(4) Please refer to figure below for designing land pattern.



(5) Please do not wash the device after soldering.

11.5. Disassembly

This device uses a volatile organic electrolyte. Please do not disassemble it.

11.6. Disposal

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

12. Proposal

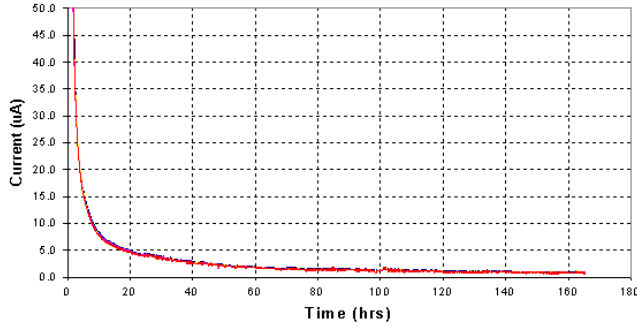
- (1) When you use, please evaluate in a state mounted by your product.
- (2) Please do not use this product other than the mention contents of this specification.
- (3) Please return us a copy after sealing with your company receipt stamp in this specification.
- (4) We think that it is not appropriate to mention a contract matter about the business in specifications, a drawing and other technical documentations.
- (5) This document specifies technical and quality specifications. No warranties or liabilities are implied implicitly or explicitly in this document. These matters should be handled elsewhere.

Specification of Electrical Double Layer Capacitor

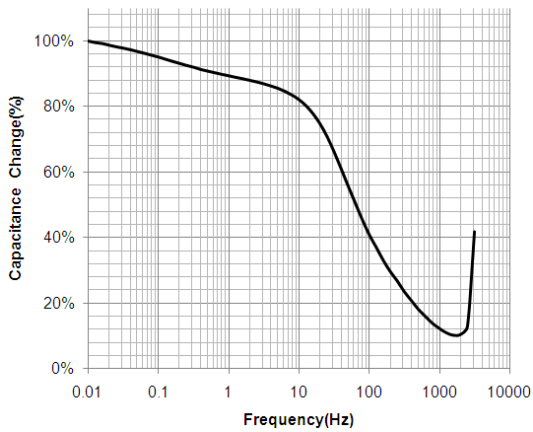
13. Performance Data

13.1. Leakage current (Typical)

Shows how leakage current decays with time as below.



13.2. Frequency Response



13.3. Temperature performance

