

Specification No. JECXDE-0028

To Mouser Electronics

SPECIFICATION

Date: August 30, 2013

Product Description: Electrical Double Layer Capacitor

Customer Part Number: _____

Murata Part Number: DMT334R2S474M3DTA0

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

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

DMT □□ □□□ □ □□□ □ □□ □ □□

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

Number	Name	Code ex.	Specification						
(1)	Series	DMT	> Thin laminate & High reliability type > Operating temperature: -30deg C~85 deg C > Storage temperature: -40deg C~85 deg C > Rated voltage: 4.2V Use within the following periods of time at each operation temperature; ~60 degC,4.2V: 87,600hrs (10years) ~70 degC,4.2V: 43,800hrs (5years) ~85 degC,4.2V: 8,760hrs (1year)						
(2)	Dimensions	33	<table border="1"> <thead> <tr> <th>Code</th> <th>LW</th> <th>T: Thickness(mm)</th> </tr> </thead> <tbody> <tr> <td>33</td> <td>L:21.0+/-0.5mm W:14.0+/-0.5mm</td> <td>3.5 +0.3/-0.3</td> </tr> </tbody> </table> T: Measured by 10mmΦplate with 0.9N. Details shown in section 5.	Code	LW	T: Thickness(mm)	33	L:21.0+/-0.5mm W:14.0+/-0.5mm	3.5 +0.3/-0.3
Code	LW	T: Thickness(mm)							
33	L:21.0+/-0.5mm W:14.0+/-0.5mm	3.5 +0.3/-0.3							
(3)	Rated voltage	4R2	4.20V: Continuous loading voltage						
(4)	ESR	S	<table border="1"> <thead> <tr> <th>Code</th> <th>Initial ESR @ 1kHz (m ohm) @25degC</th> </tr> </thead> <tbody> <tr> <td>S</td> <td>130 (max150) mΩ</td> </tr> </tbody> </table>	Code	Initial ESR @ 1kHz (m ohm) @25degC	S	130 (max150) mΩ		
Code	Initial ESR @ 1kHz (m ohm) @25degC								
S	130 (max150) mΩ								
(5)	Nominal Capacitance	474	<table border="1"> <thead> <tr> <th>Code</th> <th>Capacitance</th> </tr> </thead> <tbody> <tr> <td>474</td> <td>470mF(47×10⁴ uF)</td> </tr> </tbody> </table>	Code	Capacitance	474	470mF(47×10 ⁴ uF)		
Code	Capacitance								
474	470mF(47×10 ⁴ uF)								
(6)	Cap Tolerance	M	M:±20%(Standard)						
(7)	Terminal type	3D	Au plating: 3D Terminal pattern: Refer to mechanical drawing shown in section 5.						
(8)	Packaging	T	T: Tray package Details shown in section 7.						
(9)	In-house specification	A0	Murata management code						

Specification of Electrical Double Layer Capacitor

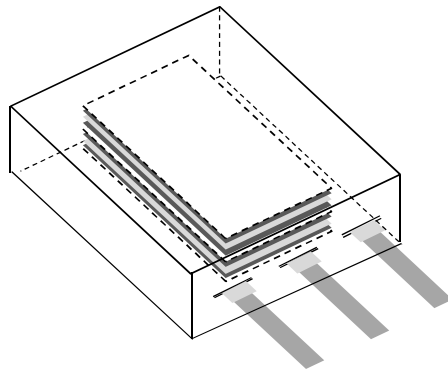
3. DMT series

Part Number	Rated Voltage	ESR @1kHz @25deg C	Nominal Capacitance @25deg C	Dimensions(mm)			Leakage current Max @96hr
				L	W	T	
DMT334R2S474M3DTA0	4.2V	130 mohm (max 150 mohm)	470 mF +/-20%	21.0 +/-0.5	14.0 +/-0.5	3.5 +/-0.3	5uA

T: Measured by 10mmΦplate with 0.9N.

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

4. Product Structure

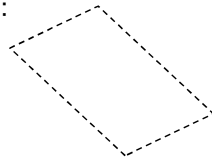


4-1. Electrolyte : Inside of 4-4-1.Laminate

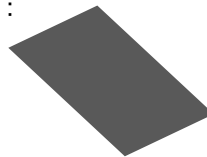
4-2. Electrode : Consisting of 4-2-1. Al Foil and 4-2-2. Carbon

4-3. Separator :

4-2-1. Al Foil :

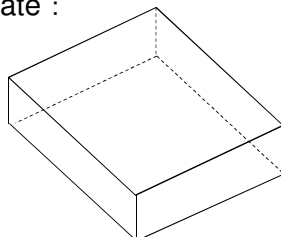


4-2-2. Carbon :

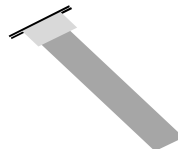


4-4. Outer Package: Consisting of 4-4-1. Laminate, 4-4-2. Withdraw Terminal + Outer Terminal,

4-4-1. Laminate :



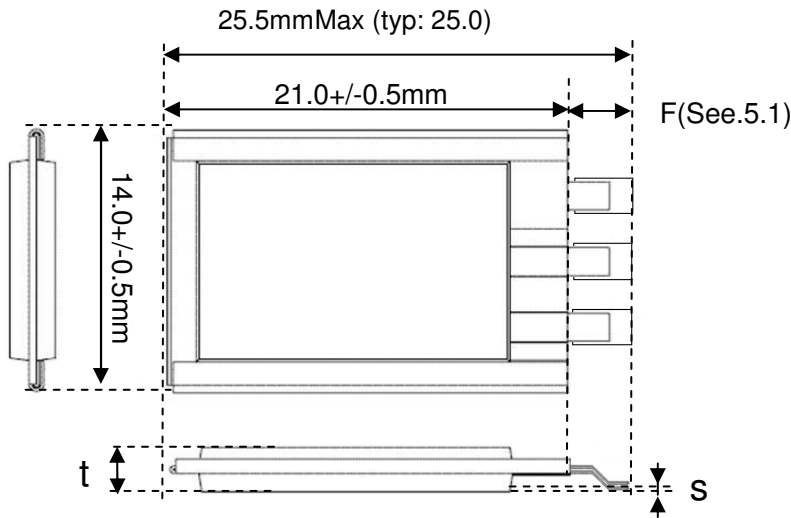
4-4-2. Withdraw Terminal + Outer Terminal :



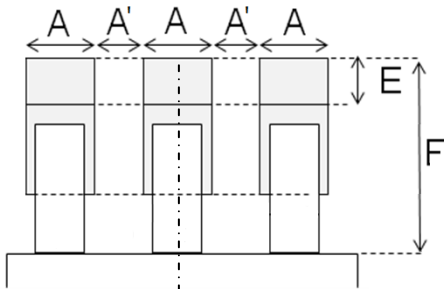
Specification of Electrical Double Layer Capacitor

5. Mechanical Drawing

Part Number	Capacitance	t(mm)	s(mm)
DMT334R2S474M3DTA0	470mF	3.5 (typical)	Less than 0.2

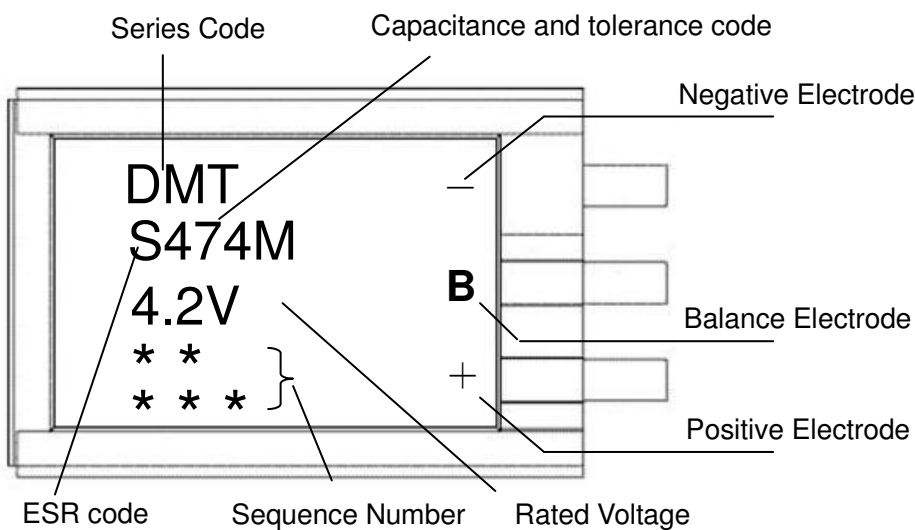


5.1 Electrode size



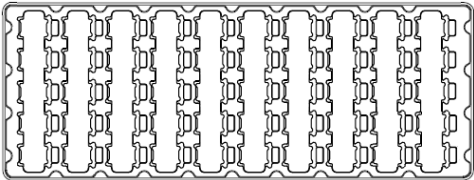
$A = 1.7 \pm 0.2 \text{ mm}$
 $A' = 1.8 \pm 0.5 \text{ mm}$
 $E = 0.9 \text{ mm (typ)}$
 $F = 4.5 \text{ mm Max (typ: 4.0 mm)}$
 E: Length of soldering area

6. Marking

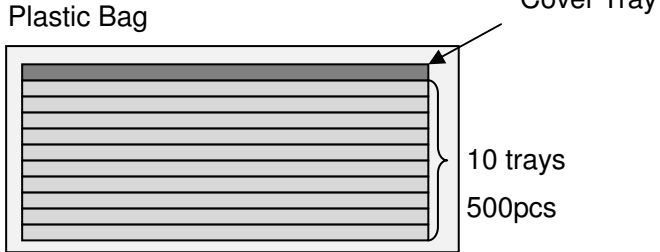


7. Packaging

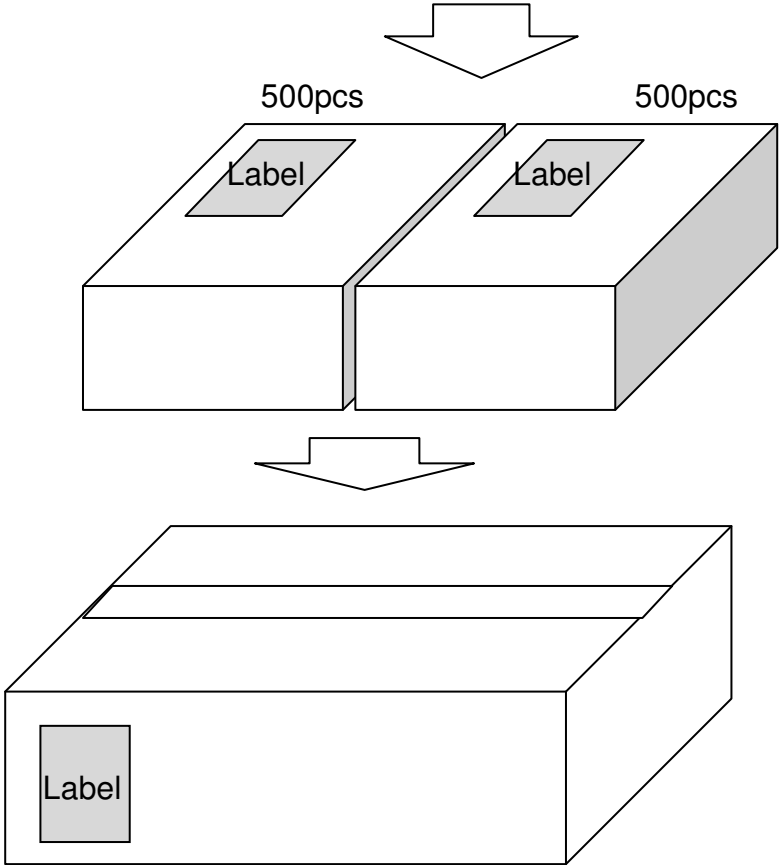
Tray (50pcs/ Tray)



Min package (500pcs)



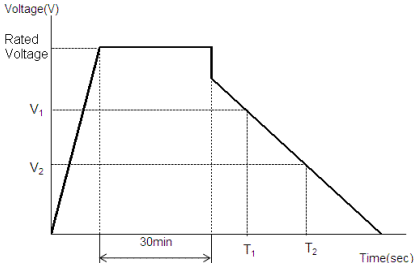
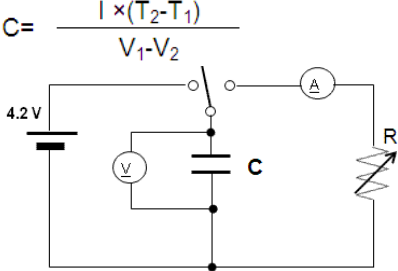
Tray size(LxW): 320mm x 120mm



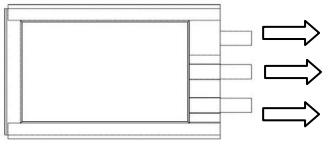
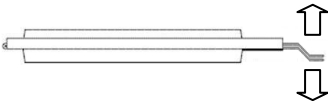
***Minimum Shipping Quantity: 500pcs**

Specification of Electrical Double Layer Capacitor

8. Performance

No	Item	Specification	Validation Method				
1	Operating Temperature	-30degC ~ +85degC					
2	Storage Temperature	-40degC ~ +85degC					
3	Appearance	No external abnormality	Visual				
4	Dimensions	Refer to section 5	Microscope, Vernier Caliper				
5	Nominal Capacitance	Satisfy the following value. <table border="1" style="margin-top: 10px;"> <thead> <tr> <th>Code</th> <th>Capacitance</th> </tr> </thead> <tbody> <tr> <td>474</td> <td>470mF+/-20%</td> </tr> </tbody> </table>	Code	Capacitance	474	470mF+/-20%	Discharge method 1. Charge capacitor for 30min at rated peak voltage 4.2V. 2. Then discharge  V1: 80% of rated peak voltage V2: 40% of rated peak voltage T1: Time with voltage V1 T2: Time with voltage V2 Discharge current: 100mA $C = \frac{I \times (T_2 - T_1)}{V_1 - V_2}$ 
Code	Capacitance						
474	470mF+/-20%						
6	ESR	<table border="1" style="margin-top: 10px;"> <thead> <tr> <th>Code</th> <th>Initial ESR @ 1kHz (m Ohm) @25C</th> </tr> </thead> <tbody> <tr> <td>S</td> <td>130 (max150)</td> </tr> </tbody> </table>	Code	Initial ESR @ 1kHz (m Ohm) @25C	S	130 (max150)	<Impedance Method> Measured at AC1kHz. Current: 10mA - 200mA
Code	Initial ESR @ 1kHz (m Ohm) @25C						
S	130 (max150)						
7	Leakage current	Less than or equal to 5uA at 96hrs after charging	Temperature: 25+/-2degC				

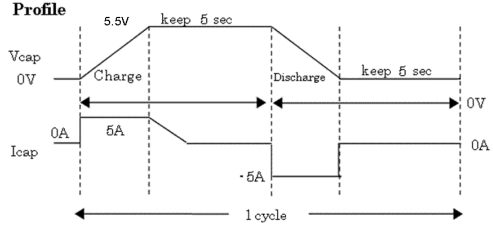
Specification of Electrical Double Layer Capacitor

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>85 (Max temp.)</td> <td>+/-20%</td> </tr> <tr> <td>40(Ref.)</td> <td>+/-20%</td> </tr> <tr> <td>25</td> <td>-</td> </tr> <tr> <td>0(Ref.)</td> <td>+/-20%</td> </tr> <tr> <td>-20(Ref.)</td> <td>+/-20%</td> </tr> <tr> <td>-30 (Min temp.)</td> <td>+/-20%</td> </tr> </tbody> </table> <p>ESR(@1kHz)</p> <table border="1"> <thead> <tr> <th>Temperature (deg C)</th> <th>ESR change relative to initial value(@ 1kHz)</th> </tr> </thead> <tbody> <tr> <td>85(Max temp.)</td> <td>+100% or less</td> </tr> <tr> <td>70(Ref)</td> <td>+100% or less</td> </tr> <tr> <td>40(Ref)</td> <td>+100% or less</td> </tr> <tr> <td>25</td> <td>-</td> </tr> <tr> <td>0(Ref)</td> <td>+200% or less</td> </tr> <tr> <td>-20(Ref)</td> <td>+400% or less</td> </tr> <tr> <td>-30(Min temp.)</td> <td>+600% or less</td> </tr> </tbody> </table>	Temperature (deg C)	Capacitance change versus 25degC	85 (Max temp.)	+/-20%	40(Ref.)	+/-20%	25	-	0(Ref.)	+/-20%	-20(Ref.)	+/-20%	-30 (Min temp.)	+/-20%	Temperature (deg C)	ESR change relative to initial value(@ 1kHz)	85(Max temp.)	+100% or less	70(Ref)	+100% or less	40(Ref)	+100% or less	25	-	0(Ref)	+200% or less	-20(Ref)	+400% or less	-30(Min temp.)	+600% or less	<p>Temperature setting value +/- 2degC. > Capacitance measured with discharge method specified in No 5. > ESR measured with AC 1kHz specified in No 6.</p>
Temperature (deg C)	Capacitance change versus 25degC																																
85 (Max temp.)	+/-20%																																
40(Ref.)	+/-20%																																
25	-																																
0(Ref.)	+/-20%																																
-20(Ref.)	+/-20%																																
-30 (Min temp.)	+/-20%																																
Temperature (deg C)	ESR change relative to initial value(@ 1kHz)																																
85(Max temp.)	+100% or less																																
70(Ref)	+100% or less																																
40(Ref)	+100% or less																																
25	-																																
0(Ref)	+200% or less																																
-20(Ref)	+400% or less																																
-30(Min temp.)	+600% or less																																
9-1	Terminal strength1	No break or crack on any terminal by applying less than 5N.	 <p>Hold the capacitor body and pull terminal.</p>																														
9-2	Terminal strength2	No break or crack on any terminal by applying less than 1N.	 <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 1.0~2.0mm from terminal head. 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>Item</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>Thickness @25degC</td> <td>Satisfy initial value</td> </tr> <tr> <td>Appearance</td> <td>No abnormality and No electrolyte leakage.</td> </tr> </tbody> </table>	Item	Specification	Capacitance	Satisfy initial value	ESR	Satisfy initial value	Leakage current	Satisfy initial value	Thickness @25degC	Satisfy initial value	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 pararell to the test spot of terminal *Avoid contact of soldering tip with capacitor body.</p>																		
Item	Specification																																
Capacitance	Satisfy initial value																																
ESR	Satisfy initial value																																
Leakage current	Satisfy initial value																																
Thickness @25degC	Satisfy initial value																																
Appearance	No abnormality and No electrolyte leakage.																																

Specification of Electrical Double Layer Capacitor

No	Item	Specification	Validation Method																						
12	Vibration tests	<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>Satisfy initial value</td> </tr> <tr> <td>Appearance</td> <td>No external 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	Satisfy initial value	Appearance	No external abnormality and No electrolyte leakage.	<p>Test condition: Voltage:4.2+0/-0.1V Acceleration amplitude:10~150Hz 5.0G Sweep cycle: 20times/X, Y and Z direction Sweep Time: log 8minutes for each way</p> <p>Fix the capacitor on substrate by double-stick tape (Nitto Denko Corporation, No.5000NS) so that bibration stress will be applied to the inside of the capacitor package. . No stress on the terminals</p>										
Items	Specification																								
Capacitance	-20% of initial value																								
ESR	+20% of initial value																								
Leakage current	Satisfy initial value																								
Thickness @25degC	Satisfy initial value																								
Appearance	No external abnormality and No electrolyte leakage.																								
13	Temperature cycle.	<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 Range: -40degC to +85degC (30 min/each) Test Cycles: 256 cycles *Without charging. 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>-40+/-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>*Temperature change should be done within five minutes *Measure characteristics at 25degC.</p>		Temperature	1	Room Temperature 25+/-2degC	2	-40+/-2degC	3	Room Temperature 25+/-2degC	4	85+/-2degC	5	Room Temperature 25+/-2degC
Items	Specification																								
Capacitance	-20% of initial value																								
ESR	+20% of initial value																								
Leakage current	Satisfy initial value																								
Appearance	No abnormality and No electrolyte leakage.																								
	Temperature																								
1	Room Temperature 25+/-2degC																								
2	-40+/-2degC																								
3	Room Temperature 25+/-2degC																								
4	85+/-2degC																								
5	Room Temperature 25+/-2degC																								
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>Max 0.1mm thicker than initial thickness</td> </tr> <tr> <td>Thickness @85degC</td> <td>Max 0.3mm 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	Max 0.1mm thicker than initial thickness	Thickness @85degC	Max 0.3mm thicker than initial thickness	Appearance	No abnormality and No electrolyte leakage.	<p>Temperature: 85+0/-3degC Duration: 1000hrs+3/0hrs *Without charging * Measure characteristics at 25degC. *Keep device for 2hrs or more at 25degC before measuring.</p>								
Items	Specification																								
Capacitance	-20% of initial value																								
ESR	+20% of initial value																								
Leakage current	Satisfy initial value																								
Thickness @25degC	Max 0.1mm thicker than initial thickness																								
Thickness @85degC	Max 0.3mm thicker than initial thickness																								
Appearance	No abnormality and No electrolyte leakage.																								
15	Storage at High humidity.	<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>Max 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	-20% of initial value	ESR	+20% of initial value	Leakage current	Satisfy initial value	Thickness @25degC	Max 0.1mm thicker than initial thickness	Appearance	No abnormality and No electrolyte leakage.	<p>Temperature: 40+0/-3degC Humidity: 90-95% Duration: 240+12/-0 hrs. *Without charging *Characteristics are measured at 25degC. * Keep device for 2hrs or more at 25degC before measuring.</p>										
Items	Specification																								
Capacitance	-20% of initial value																								
ESR	+20% of initial value																								
Leakage current	Satisfy initial value																								
Thickness @25degC	Max 0.1mm thicker than initial thickness																								
Appearance	No abnormality and No electrolyte leakage.																								

Specification of Electrical Double Layer Capacitor

No	Item	Specification	Validation Method												
16	Storage at cold temperatures	<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>Thickness @25degC</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	Satisfy initial value	ESR	Satisfy initial value	Leakage current	Satisfy initial value	Thickness @25degC	Satisfy initial value	Appearance	No abnormality and No electrolyte leakage.	Temperature: -40+3/-0degC Duration : 1000+3/-0hrs *Without charging *Measure characteristics at 25degC. *Keep device for 2hrs or more at 25degC before measuring.
Items	Specification														
Capacitance	Satisfy initial value														
ESR	Satisfy initial value														
Leakage current	Satisfy initial value														
Thickness @25degC	Satisfy initial value														
Appearance	No abnormality and No electrolyte leakage.														
17	High temperature loading	<table border="1"> <thead> <tr> <th>Items</th> <th>Specification</th> </tr> </thead> <tbody> <tr> <td>Capacitance</td> <td>-40% of initial value</td> </tr> <tr> <td>ESR</td> <td>+50% of initial value</td> </tr> <tr> <td>Leakage current</td> <td>Satisfy initial value</td> </tr> <tr> <td>Thickness @25degC</td> <td>Max 1.0mm thicker than initial thickness.</td> </tr> <tr> <td>Appearance</td> <td>No abnormality and No electrolyte leakage.</td> </tr> </tbody> </table>	Items	Specification	Capacitance	-40% of initial value	ESR	+50% of initial value	Leakage current	Satisfy initial value	Thickness @25degC	Max 1.0mm thicker than initial thickness.	Appearance	No abnormality and No electrolyte leakage.	Voltage: DC 4.2 +0/-0.1 V Temperature: 85+/-2degC Duration: 1000+48hrs/-0hrs Charge and discharge current:500mA max *Measure characteristics at 25degC. *Keep device for 2hrs or more at 25degC before measuring.
Items	Specification														
Capacitance	-40% of initial value														
ESR	+50% of initial value														
Leakage current	Satisfy initial value														
Thickness @25degC	Max 1.0mm thicker than initial thickness.														
Appearance	No abnormality and No electrolyte leakage.														
18	High humidity loading	<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>Max 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	-20% of initial value	ESR	+20% of initial value	Leakage current	Satisfy initial value	Thickness @25degC	Max 0.1mm thicker than initial thickness	Appearance	No abnormality and No electrolyte leakage.	Voltage: DC 4.2 +0/-0.1 V Temperature: 40+0/-3degC Humidity: 90-95% Duration:500+/-12hrs *Measure characteristics at 25degC. *Keep device for 2hrs or more at 25degC before measuring.
Items	Specification														
Capacitance	-20% of initial value														
ESR	+20% of initial value														
Leakage current	Satisfy initial value														
Thickness @25degC	Max 0.1mm thicker than initial thickness														
Appearance	No abnormality and No electrolyte leakage.														
19	Charge-Discharge Cycle Test	<table border="1"> <thead> <tr> <th>Items</th> <th>Specification</th> </tr> </thead> <tbody> <tr> <td>Capacitance</td> <td>-30% of initial value</td> </tr> <tr> <td>ESR</td> <td>+40% of initial value</td> </tr> <tr> <td>Leakage current</td> <td>Satisfy initial value</td> </tr> <tr> <td>Thickness @25degC</td> <td>Max 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	-30% of initial value	ESR	+40% of initial value	Leakage current	Satisfy initial value	Thickness @25degC	Max 0.1mm thicker than initial thickness.	Appearance	No abnormality and No electrolyte leakage.	Charge voltage: 4.2 +0/-0.1V Temp.: 40 +/-2 degC Current: 5.0+0/-0.1A Cycle number: 50000 Profile  <p>The graph shows the voltage (V_{cap}) and current (I_{cap}) profiles over one cycle. The voltage starts at 0V, rises to 5.5V during the 'Charge' phase, remains constant at 5.5V for 5 seconds, then falls to 0V during the 'Discharge' phase, and remains constant at 0V for 5 seconds. The current starts at 0A, rises to 5A during the 'Charge' phase, remains constant at 5A, then falls to -5A during the 'Discharge' phase, and remains constant at -5A. The total duration of one cycle is 10 seconds.</p>
Items	Specification														
Capacitance	-30% of initial value														
ESR	+40% of initial value														
Leakage current	Satisfy initial value														
Thickness @25degC	Max 0.1mm thicker than initial thickness.														
Appearance	No abnormality and No electrolyte leakage.														

Specification of Electrical Double Layer Capacitor

9. Safety Test Specification

No	Item	Specification	Validation Method
1	Puncture	No smoke, ignition or rupture	Preprocessing: Charge up to rated peak voltage at 25degC. Fully penetrate the center of capacitor by a 2.5φ needle. Temperature: 85degC
2	Compression	No smoke, ignition or rupture	Preprocessing: 1. Charge device to rated peak 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 85+/-2deg C.
3	External Short Circuit	No leakage, smoke, ignition or rupture	Preprocessing: Charge up device to rated peak voltage at 25degC Connect plus and minus terminals by external resistance of 80+/- 20mohm. Temperature: 85degC.
4	Heating	No smoke, no ignition.	Preprocessing: Charge up to peak 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) Other equivalent machinery

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

- (1)Military equipment (2) Medical Equipment

Specification of Electrical Double Layer Capacitor

11.2 STORAGE CONDITIONS

11.2.1 Storage condition without opening outer package.

30degC 60%RH for 1 year (Before opening outer package)
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 voltage is 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 10 times	10-100times	100 times or more
2.0V and over /cell	100kΩ or less	47kΩ or less	4.7kΩ or less
Under 2.0V/cell	100kΩ or less	100kΩ or less	10kΩ or less

Supposed condition: Temperature is always under 70degC. Within five years
If using capacitor always at over 70degC, please consult a Murata representative.

Specification of Electrical Double Layer Capacitor

(3) Applicable wave form

Fig 1. Permitted loading.

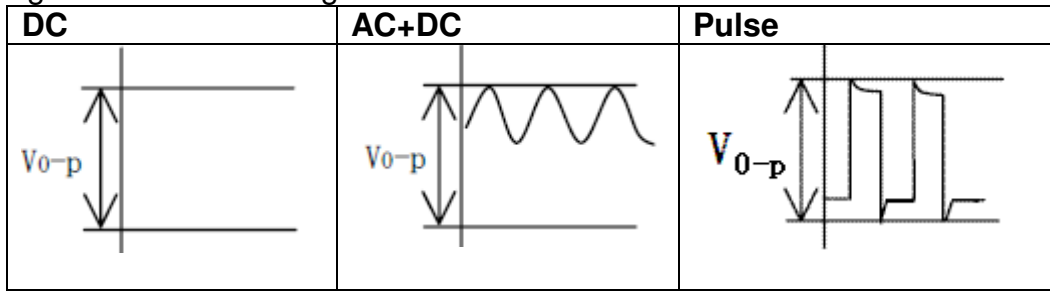
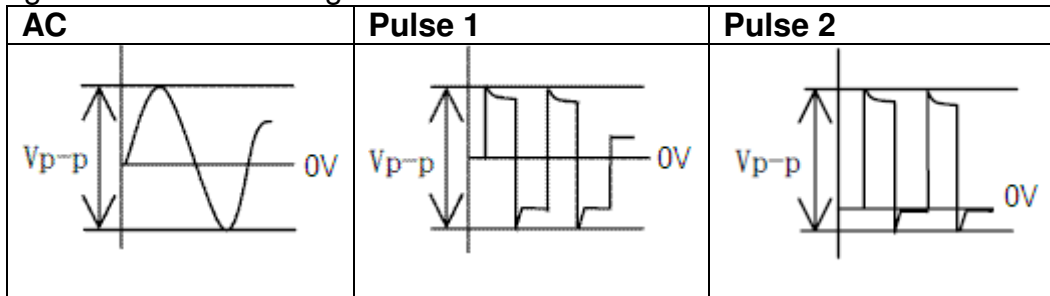


Fig 2. Restricted loading.



<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 $\phi 0.1\text{mm}$ 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) 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, connector mounting, 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.

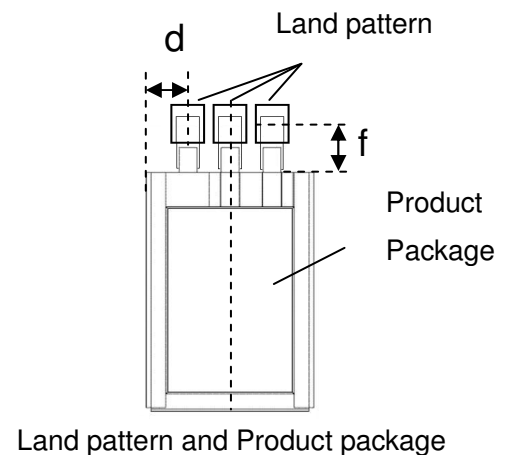
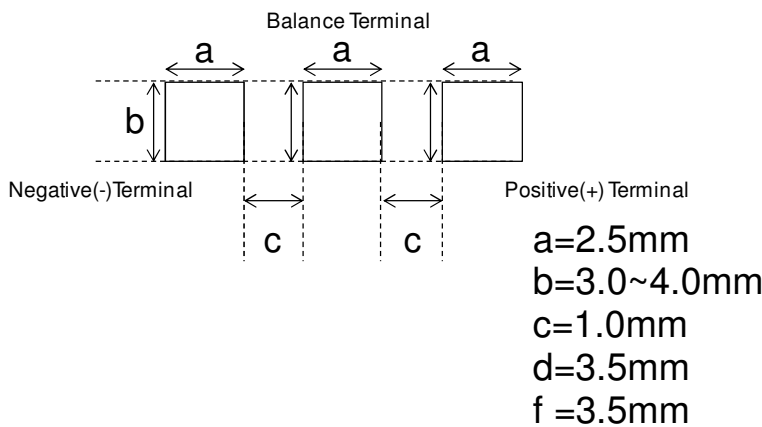
Specification of Electrical Double Layer Capacitor

(3) Hand Soldering

Please solder under following conditions.
 Soldering iron temperature at 350 deg C +/-10 deg C
 Solder Iron wattage: 70W or less
 Soldering time: 3~4 sec per one terminal
 Allowable soldering frequencies: 3 times /device.

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) Please refer to figure below for designing land pattern.



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

11.5. 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.

11.6. Disassembly

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

11.7. Disposal

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

11.8. Response to IATA Dangerous Goods Regulations

According to 54th Edition of IATA Dangerous Goods Regulations effective from January 1, 2013, Electrical Double Layer Capacitor (ELDC) with an energy storage capacity greater than 0.3Wh is treated as dangerous goods and introduced as UN3499 in Class 9.

However, an energy storage capacity of each Murata's EDLCs is not greater than 0.3Wh. Therefore, Murata's EDLCs are not covered by this regulation.

12. Proposal

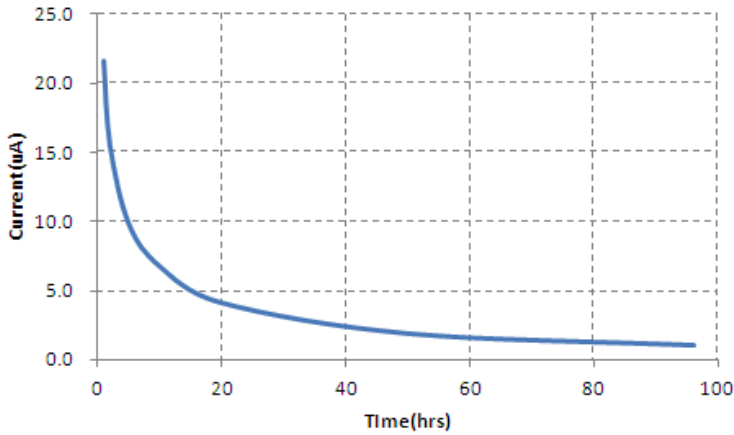
- (1) When you use, please evaluate in a state mounted by your product.
- (2) Please do not use this product other than the mentioned contents of this specification.
- (3) Please return us a copy after sealing with your company receipt stamp in this specification.
- (4) We think that it is not appropriate 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

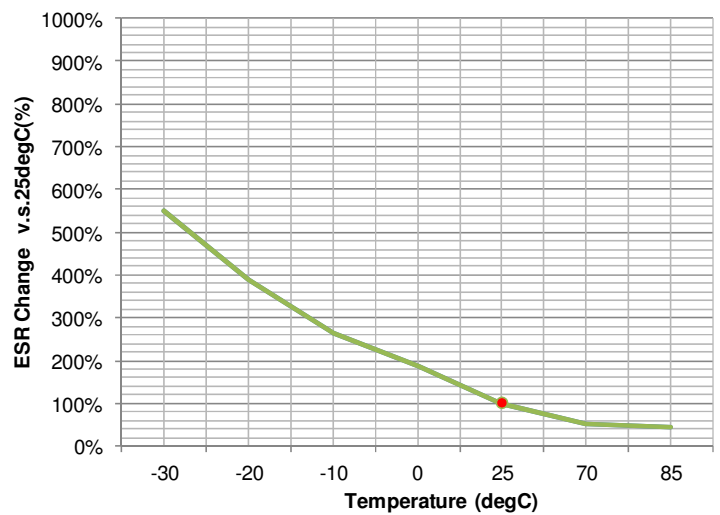
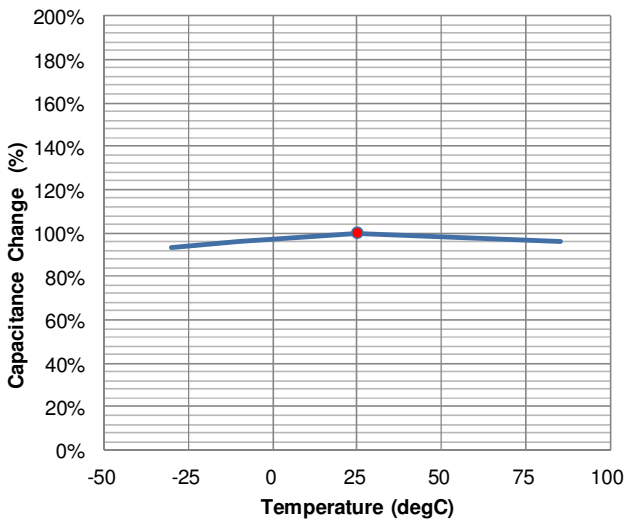
13.1. Leakage current (Typical)

Shows how leakage current decays with time as below.

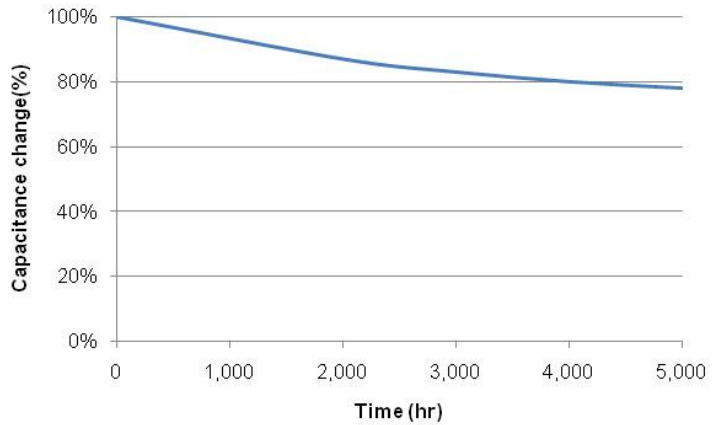
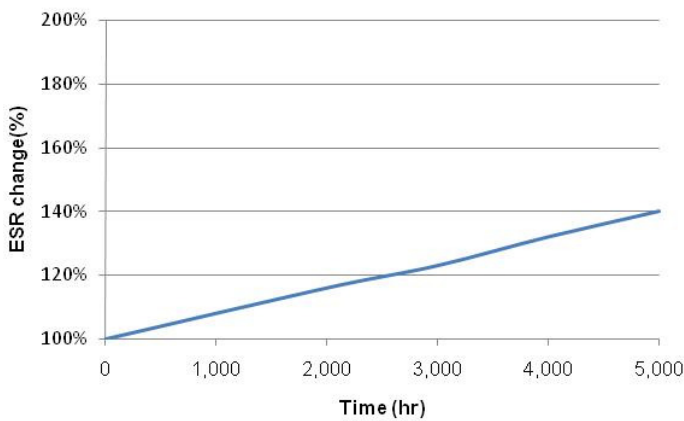


13.2. Temperature performance

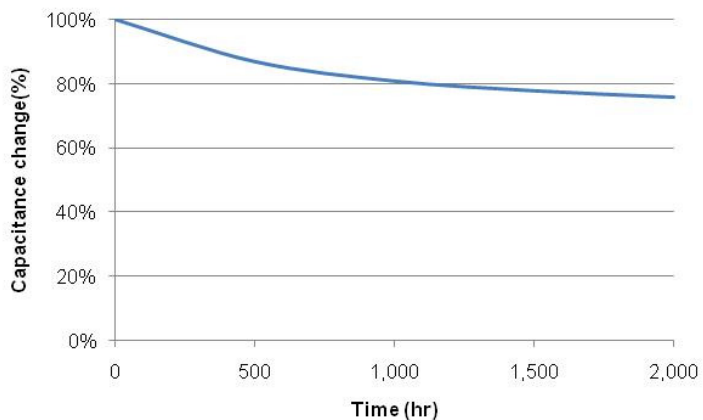
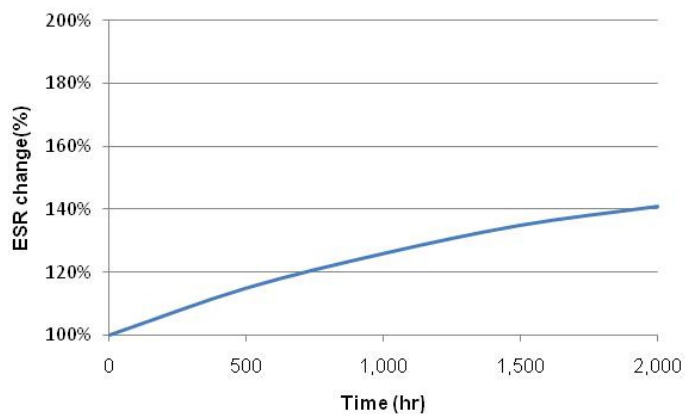
Reference temperature: 25degC



13.3. High temperature load test (Typical)



High temperature test 1: apply 70degC/4.2V



High temperature test 2: apply 85 degC/4.2V