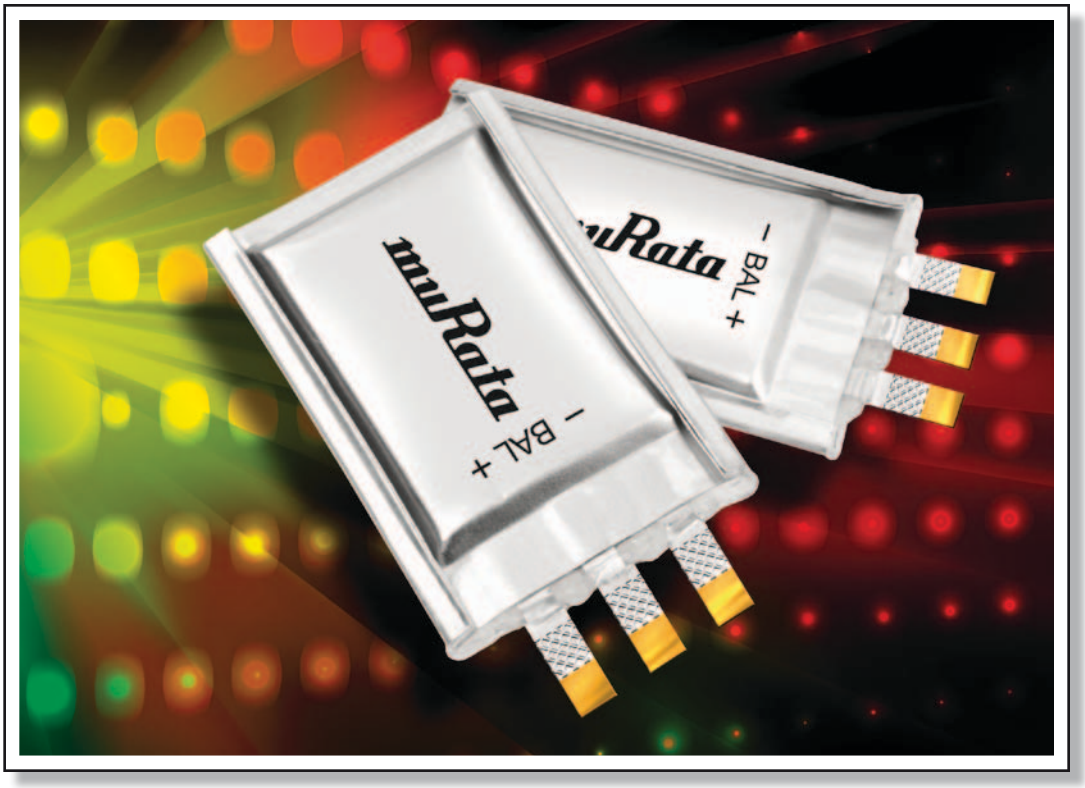
muRata
Innovator in Electronics

Product Guide

High Performance Electrical Double-Layer Capacitors

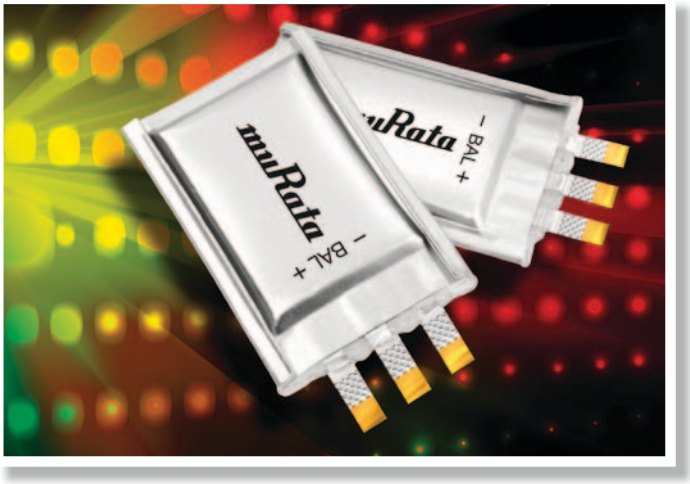
DMT Series



High Performance Electrical Double-Layer Capacitors

To meet consumer demand for mobile devices with greater efficiency and functionality, Murata began focusing its R&D efforts on Electrical Double-Layer Capacitors (EDLC) in 2008, at which time we made a strategic decision to license leading-edge supercapacitor technology from CAP-XX Limited (CAP-XX), an Australia-based firm. Working from this collaborative basis, Murata has enhanced the design and manufacture of these high power (low ESR) EDLCs in a compact, slim package, and we continue our research efforts to develop even better and higher performing products.

Electrical Double-Layer Capacitors (EDLCs), often referred to as supercapacitors, are energy storage devices with high power density characteristics that are up to 1,000 times greater than what is typically found in conventional capacitor technology. Murata's Electrical Dou ble Layer Capacitor combines these advanced characteristics in a small and slim module. Optimization of electrochemical systems, including the electrode structure, enables flexible charging and discharging from high to low output over a range of temperatures. In Murata's EDLC lineup, the DMT series offers superior long-term, high temperature reliability (five years at 70°C), with a maximum operating temperature of 85°C. The DMT series is ideally suited for applications such as solid state drive (SSD) and communication system backup, power assistance for battery and smart meters, and energy-harvesting devices.



Features

- *Long-term reliability of five years at 70°C*
- *Innovative internal structure design enabling high voltage operation: 4.2V*
- *Compact and slim: 21.0mm x 14.0mm x 3.5mm*
- *Low ESR of 130mΩ enabling high-current, high-output charging and discharging*
- *Low leakage current*
  - *Typical leakage less than 5μA@96hrs*

Benefits

- *Leveling the high peak load up to hundreds of milli-seconds*
  - *Extend battery run time and cycle life by stable combination with EDLC*
  - *Enable the use of lower power battery or reduction of the number of series connections*
  - *Enable the use of high peak load applications without high power battery*
- *Quick Charge and Discharge of High Energy*
  - *Secure power line from large load change and power down*
  - *Secure battery power down at lower temperatures*
  - *Shorten the standby time*
  - *Extend battery run time*
- *Maintenance-free energy storage device with flexible charge*

Applications

- *Peak Power Assist*
  - *Smart meters (telecommunication system, valve operation, etc)*
- *Backup Applications*
  - *SSD (solid state drives), UPS, last gasp applications*
- *Energy Harvesting Systems*
  - *Micro and macro energy harvesting systems*
- *Battery Peak Load Leveling*
  - *Point of sale equipment, tablet PCs, audio, smart meters, GPS/GPRS tracking systems, fuel cells, primary cell equipment, power tools*

Product Lineup

Series	Murata Part Number	Rated Voltage	Nominal Capacitance	Nominal ESR@1kHz	Thickness	Operating Temperature
DMT (High reliability type)	DMT334R2S474M3DTA0	Constant 4.2V	470mF	130mΩ	3.5mm	Min:-30° Max:85° 70° 5 years

Part Number Description

DMT	33	4R2	S	474	M	3D	T	A0
①	②	③	④	⑤	⑥	⑦	⑧	⑨

1. Series

DMT	High Reliability Type

2. External Dimension (L×W×T) (mm)

Code	L	W	T
33	21.0±0.5	14.0±0.5	3.5±0.3

3. Rated Voltage
Expressed by three-digit alphanumerics

Code	Rated Voltage
4R2	4.2V(constant)

4. ESR

Code	ESR @1kHz
S	130mΩ

5. Nominal Capacitance

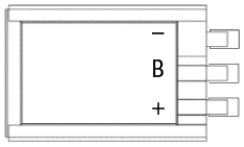
Expressed by three-digit numeric code. The unit is in micro-farad (μ). The first and second figures are significant digits, and the third figure expresses the number of zeros that follow the two numbers.

Code	Nominal Capacitance
474	47×10^4μF=470mF

6. Capacitance Tolerance

Code	Tolerance
M	±20%

7. External Terminal

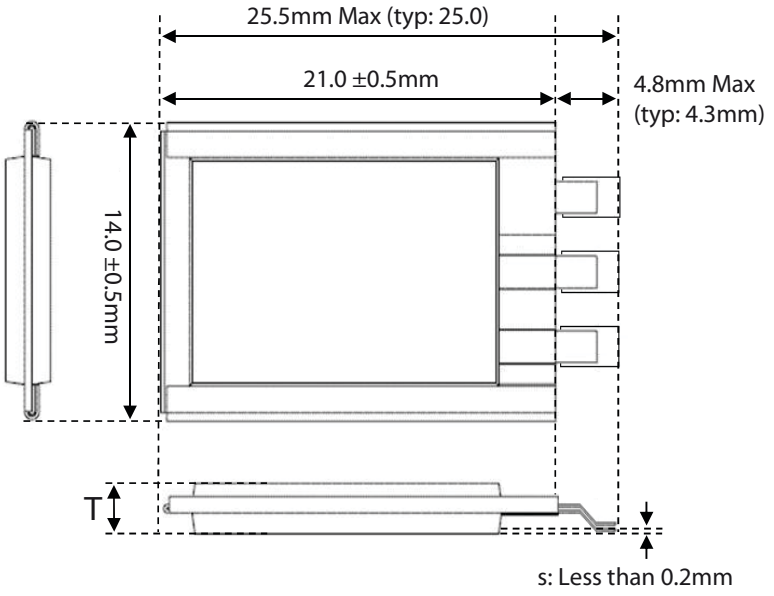
Code	Terminal Specification
3D	3 Terminals (+ / – / Balance) 

8. Packing Code

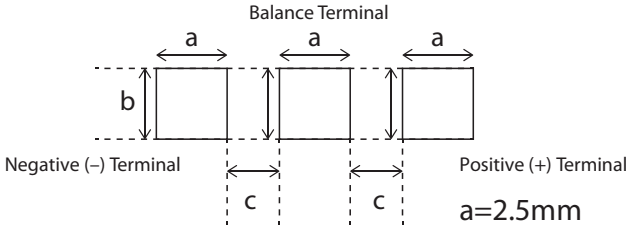
Code	Packing Specification
T	Tray Type, 50pcs/Tray

9. Inhouse Specification Code
Expressed by two-digit alphanumerics

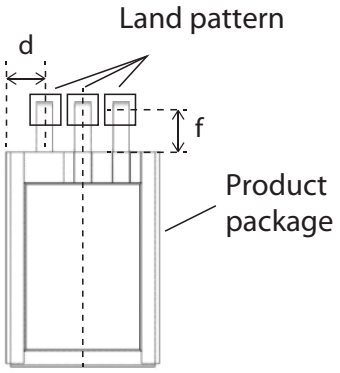
Dimensions (mm)



Land Pattern Design

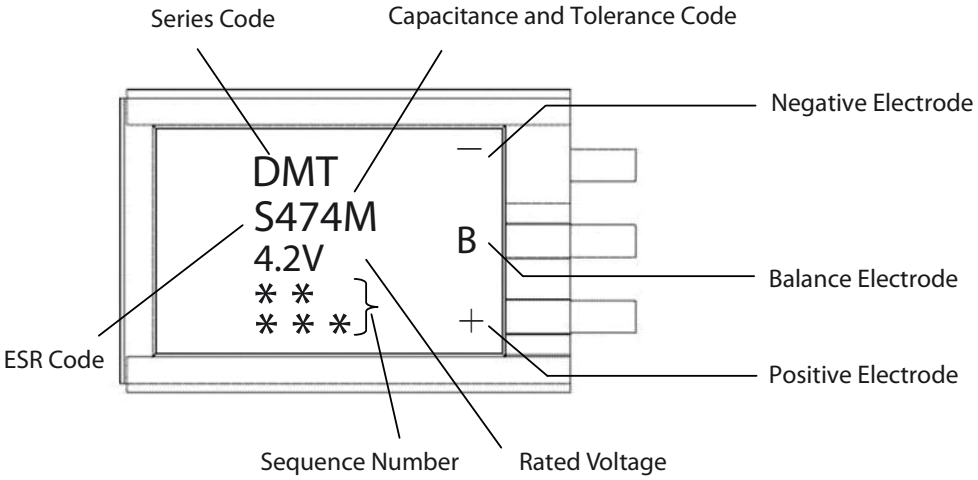


a=2.5mm
b=3.0~4.0mm
c=1.0mm
d=3.5mm
f =3.5mm

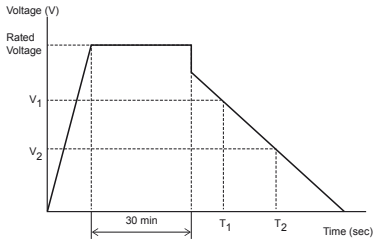
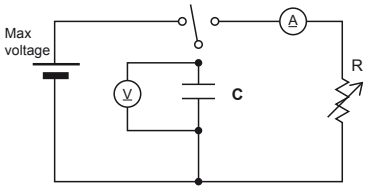


Land pattern and Product package

Marking

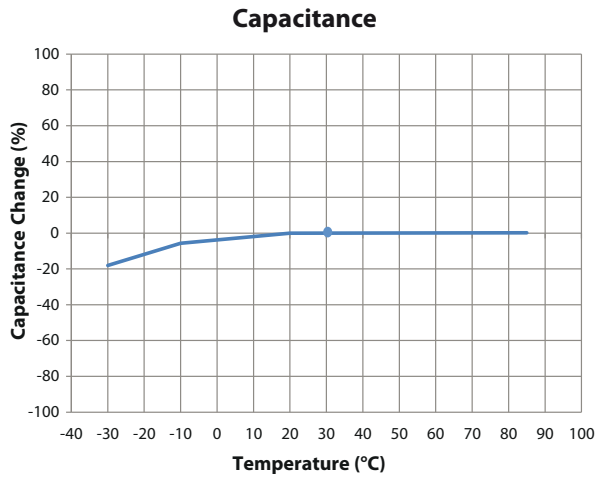


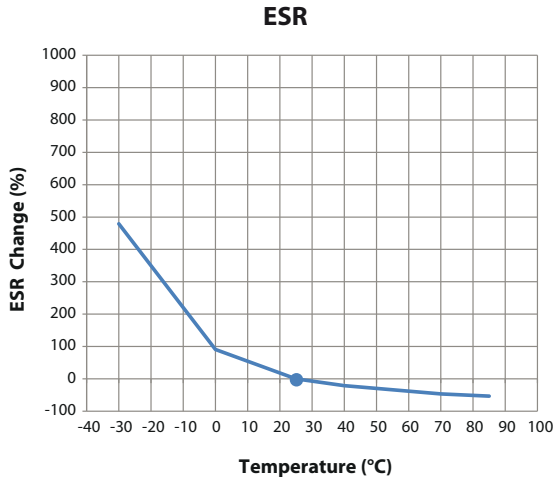
Performance and Validation Method

Item	Validation Method	Specification
Operating Temperature	–	-30°C to +85°C
Nominal Capacitance	Discharge method 1. Charge capacitor for 30min at rated voltage. 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 $C = \frac{I \times (T_2 - T_1)}{V_1 - V_2}$  	Please refer to Lineup list
ESR	Impedance Method Measured at AC1kHz Current: 10mA - 200mA	Please refer to Lineup list
Leakage Current @96hrs	–	Less than or equal to 5μA at 96hrs.
Temperature Characteristics	-30°C to +85°C	**Capacitance** Temperature (°C) / Capacitance change vs. 25°C 85(max) / ±20% 70 (Ref) / ±20% 40 (Ref) / ±20% 25 / - 0 (Ref) / ±20% -20 (Ref) / ±20% -30 (Min) / ±20% **ESR(@1kHz)** Temperature (°C) / ESR change relative to initial value(@ 1kHz) 85 (Max) / +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) / +600% or less
High Temperature Loading	70°C ± 2°C 2000hrs+48hrs/-0hrs Applying rated voltage	ESR @1kHz: Under 150% of initial value Capacitance change: Over 60% of initial value

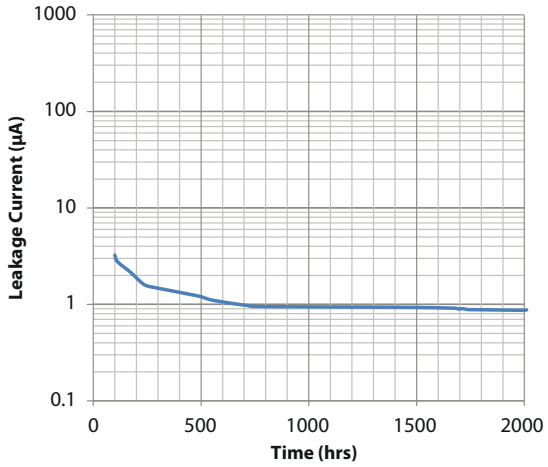
Electrical Characteristics

Capacitance and ESR Temperature Characteristics

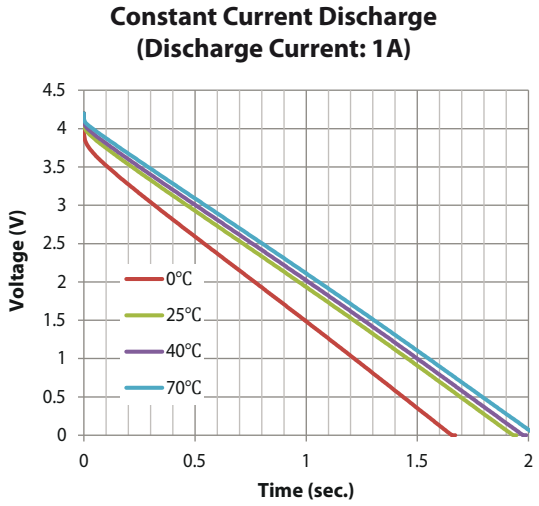


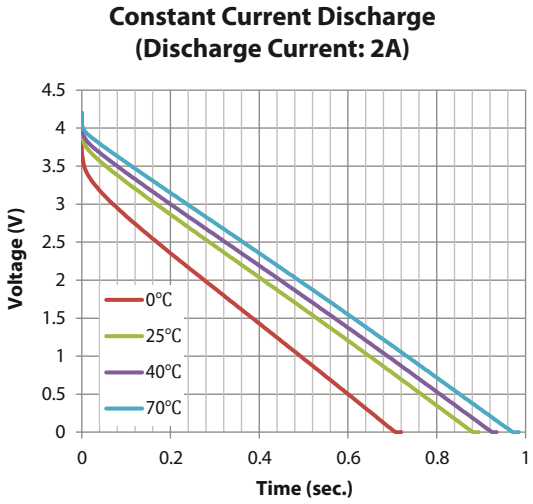


Leakage Current (@25°C)



Discharge Characteristic

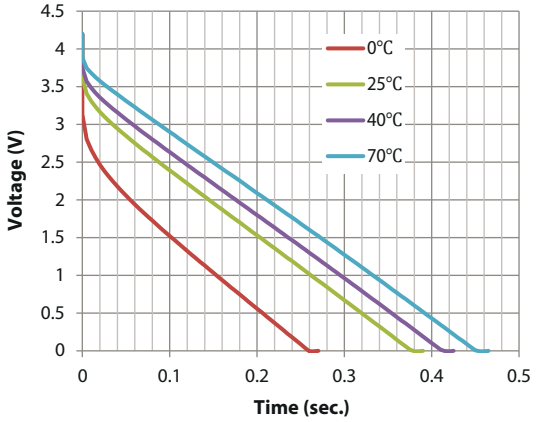




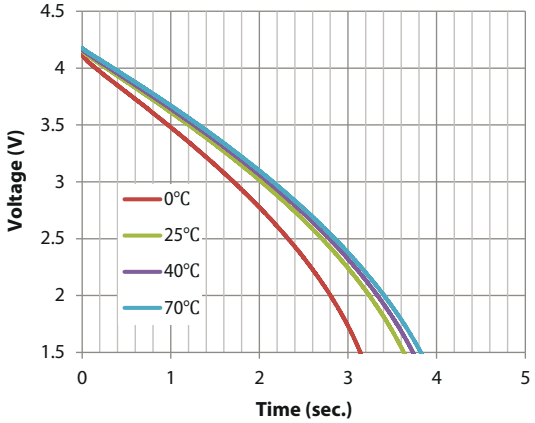
Electrical Characteristics, continued

Discharge Characteristic, continued

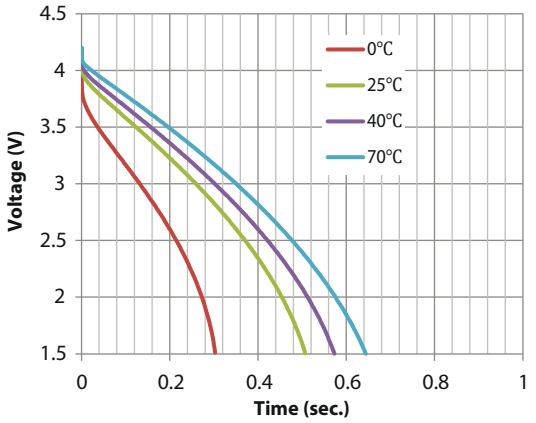
Constant Current Discharge (Discharge Current: 4A)



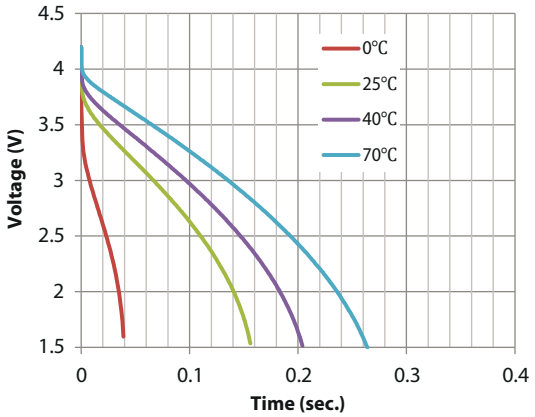
Constant Power Discharge (Discharge Power: 1W)



Constant Power Discharge (Discharge Power: 5W)

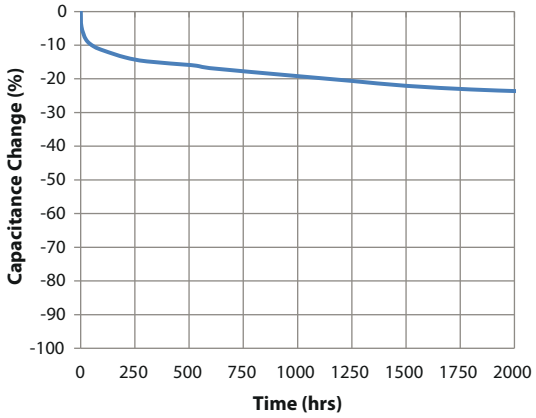


Constant Power Discharge (Discharge Power: 10W)

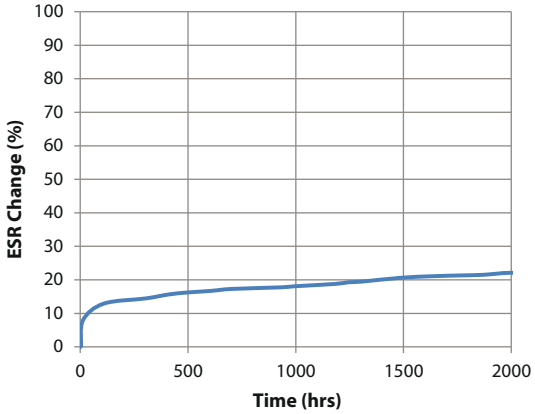


High Temperature Loading DC

High Temperature Loading Test Condition: 4.2V@70°C



Capacitance



ESR

Caution Before Use

CAUTION

- *This device must be used within rated voltage. Over voltage may cause electrolyte leakage or swelling.*
- *This device has polarity. Please do not reverse polarity when in use. Reverse polarity may damage the electrolyte or electrode inside. Please verify the orientation of the capacitor before use in accordance with the markings of polarity on the products.*
- *Avoid outer case contact to ground plane, as this may cause leakage current failure.*
- *This device cannot be used under any acidic or alkaline environment.*
- *This device uses a relatively low vapor pressure liquid electrolyte. At high altitudes (with low external pressure), internal resistance or other performance may decrease. If you would like to use this product at high altitude, please consult a Murata representative first.*
- *DMT series product has two individual cells connected electrically in series. Please ensure that peak voltage is less than 2.1V per cell for constant load. Murata strongly recommends the use of active balancing control circuits or balance resistors. For further details, contact your local Murata representative.*
- *When connecting two or more capacitors in series, voltage load may vary between capacitors. This could lead to excessive voltage on any capacitor. In these cases, please consult a Murata representative beforehand.*

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. Excessive force may result in damage to electrode terminals and/or degradation of electrical performance.*
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

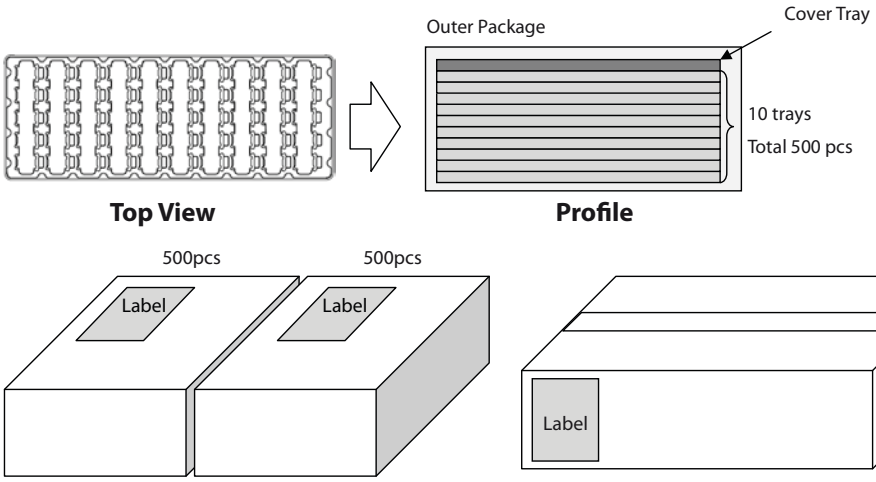
   Allowable soldering frequencies: 3 times /device.
4. *Please do not touch laminate package directly by solder iron.*

   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.
5. *Do not wash the device after soldering.*

Packaging

Tray(50 pcs/ Tray) **Min Packaging Quantity (500pcs)**



Minimum Shipping Quantity: 500 pcs

Storage Conditions ⚠

Storage condition without opening outer package:
30°C 60%RH for 1 year (before opening outer package)
*Note: This product cannot be baked.

Storage conditions after opening outer package:

1. Term of warranty is 3 months after sealed package is opened.
2. Storage environment
   Please adhere to the following conditions in sealed package:
   Temperature: 5 to 35°C; and
   Humidity: no more than 70%RH with no condensation.
   Avoid any acidic or alkaline environments.
   Avoid excessive external force while in storage.
3. Keep device in sealed plastic package before use.
4. Do not apply any heat treatment before use.

Response to IATA Dangerous Goods Regulations

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

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

Notes

Note

1. Export Control

<For customers outside Japan>

No Murata products should be used or sold, through any channels, for use in the design, development, production, utilization, maintenance or operation of, or otherwise contribution to (1) any weapons (Weapons of Mass Destruction [nuclear, chemical or biological weapons or missiles] or conventional weapons) or (2) goods or systems specially designed or intended for military end-use or utilization by military end-users.

For products which are controlled items subjects to the "Foreign Exchange and Foreign Trade Law" of Japan, the export license specified by the law is required for export.

2. Please contact our sales representatives or product engineers before using the products in this catalog for the applications listed below, which require especially high reliability for the prevention of defects which might directly damage a third party's life, body or property, or when one of our products is intended for use in applications other than those specified in this catalog.
3. Product specifications in this catalog are current as of December 2012. They are subject to change or our products in it may be discontinued without advance notice.

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

Please check with our sales representatives or product engineers before ordering or if there are any additional questions.

4. Due to space constraints, this catalog only includes limited detailed specifications. Therefore, please review our product specifications or approval sheet for specifications before ordering, particularly rating and caution (for storage, operating, rating, soldering, mounting and handling) background to prevent smoking and/or burning, etc.
5. Please note that unless otherwise specified, we shall assume no responsibility whatsoever for any conflict or dispute that may occur in connection with the effect of our and/or a third party's intellectual property rights and other related rights in consideration of your use of our products and/or information described or contained in our catalogs. In this connection, no representation shall be made to the effect that any third parties are authorized to use the rights mentioned above under licenses without our consent.
6. No ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.

Innovator in Electronics

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