muRata
INNOVATOR IN ELECTRONICS

Polymer Aluminum Electrolytic Capacitors

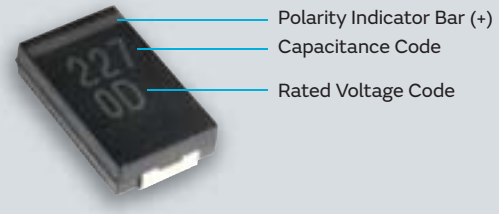


C90E.pdf
Mar.15,2018

Description

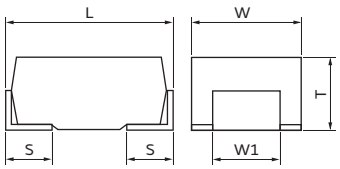
Murata Manufacturing Co., Ltd.'s ECAS series of polymer aluminum electrolytic capacitors realize low ESR, low impedence and high capacitance by means of multilayered aluminum foil for anode, solid conductive polymer for cathode. With no bias characteristics and stable temperature characteristics, ECAS series have excellent performance in ripple absorption, smoothing and transient response suitable for numerous applications.
Therefore, it is suitable for smoothing of input-output current of various power supply circuits, and the backup use over the load change of the CPU circumference.
This contributes to reduction of the number of parts, or reduction of substrate area.

Appearance



Ex.) 220µF/2V

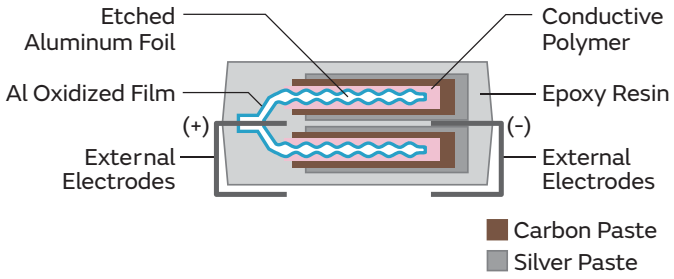
External Dimensions



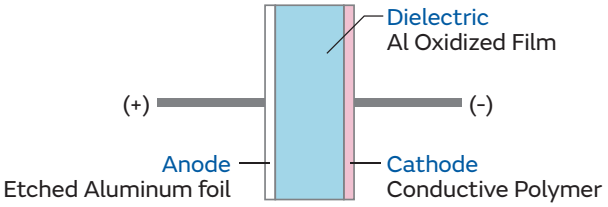
(in mm)

Case Size	EIA Metric	L	W	T	W1	S
D3	7343	7.3±0.3	4.3±0.2	1.4±0.1	2.4±0.2	1.3±0.2
D4	7343	7.3±0.3	4.3±0.2	1.9±0.1	2.4±0.2	1.3±0.2
D6	7343	7.3±0.3	4.3±0.2	2.8±0.3	2.4±0.2	1.3±0.2
D9	7343	7.3±0.3	4.3±0.3	4.2±0.3	2.4±0.2	1.3±0.2

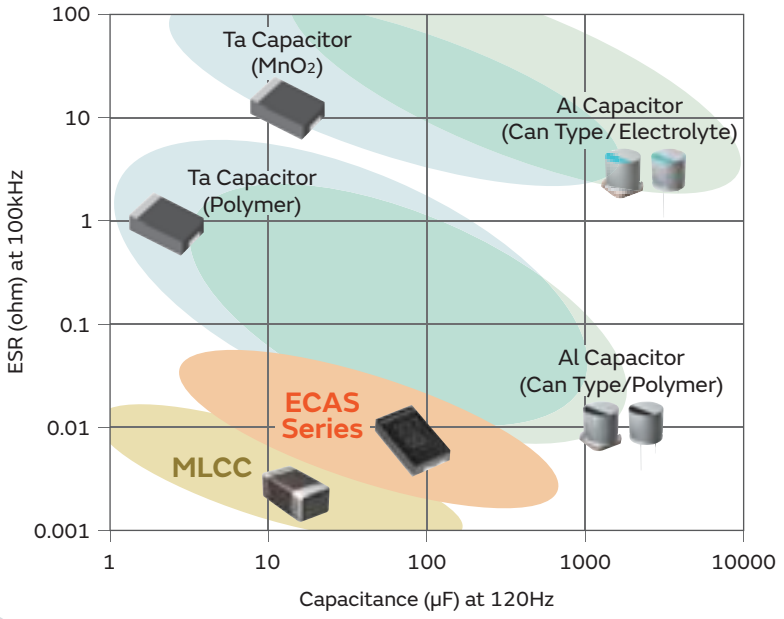
Example of Structure



Capacitor Model



Capacitor Map (Cap & ESR)



Specifications

- Capacitance Range : 6.8 to 560µF
- Operating Temperature: -40°C to +105°C
- Rated Voltage : 2 to 25Vdc
- ESR : 4.5 to 70mΩ

Features

- High capacitance and Low ESR
- Stable capacitance with applied DC voltage/temperature/high frequencies
- Excellent Ripple absorption, Smoothing, Transient response
- No voltage derating required
- Polarity bar (positive) noted on product
- Surface mount construction
- RoHS compliant
- Halogen free
- MSL 3 packaging

Product Lineup

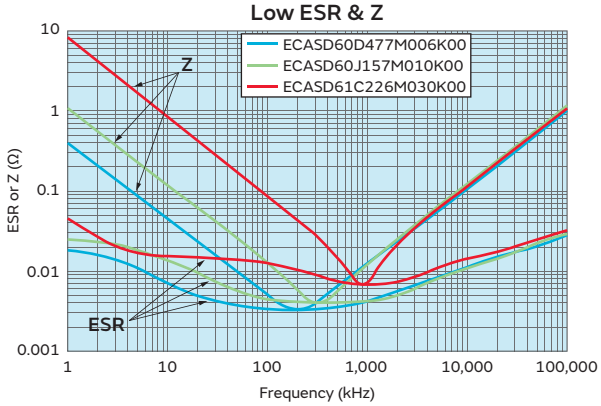
Capacitance Value (μF)

Rated Voltage (Vdc)	6.8	10	15	22	33	47	56	68	100	150	220	330	470	560
2									D4 16	D4 9	D4 9	D6 7	D6 4.5 / D6 6	D9 4.5
2.5													D6 4.5 / D6 6 / D6 9	
4								D4 20	D4 16	D4 16	D4 9 / D6 10	D9 8		
6.3		D4 55		D4 45	D4 25	D4 25		D4 15	D4 15	D6 10	D6 10	D9 9		
10		D4 55		D4 28	D4 25	D4 25		D6 15	D9 10	D9 10				
12.5		D4 55	D4 45	D4 30	D4 25	D6 20	D6 20		D9 12					
16	D4 70	D4 60	D4 40	D6 30	D4 40	D3 40 / D4 40		D4 40						
25		D4 40	D4 40	D4 40										

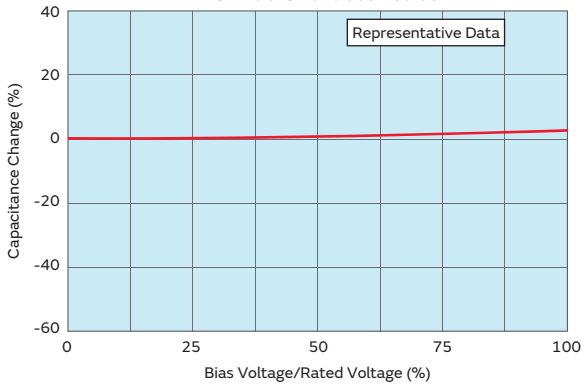
D4 55 — Case Size Code / ESR (mΩ)

Characteristics

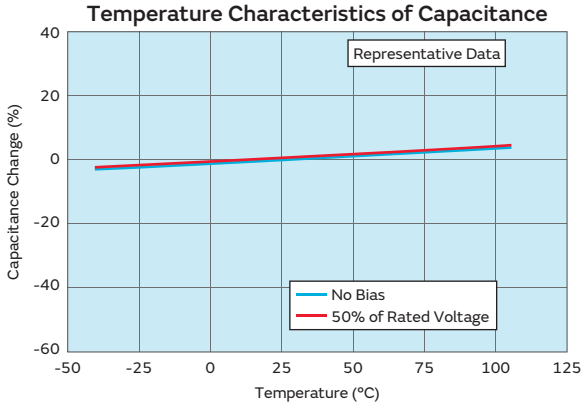
Low ESR & Z



DC Bias Characteristics



Temperature Characteristics of Capacitance



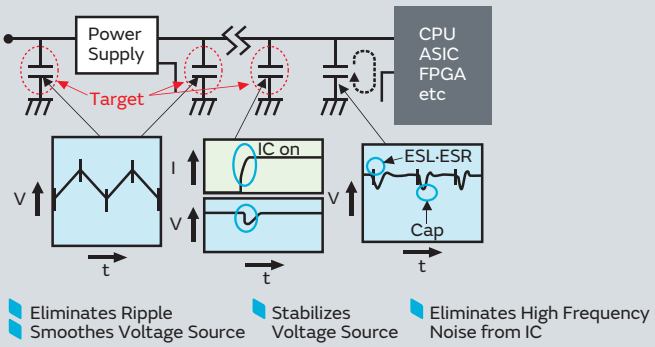
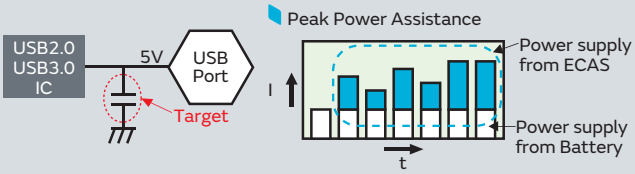
Design Support Tool - SimSurfing

https://www.murata.com/simsurfing/

- Frequency responses (Z, ESR, ESL) of ECAS Series are available.
- Netlist and S-parameter can be downloaded.
- The software "SimSurfing" is also available for your simulation on the go where no internet connection is available.

⚠Note • Please read rating and ⚠CAUTION (for storage, operating, rating, soldering, mounting and handling) in this catalog to prevent smoking and/or burning, etc.
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Applications

Market	Set/Application	Overall Power Management
Consumer 	Notebook/Ultrabook	Ex.1) Power Supply line around IC etc...  Eliminates Ripple Smoothes Voltage Source / Stabilizes Voltage Source / Eliminates High Frequency Noise from IC
	Digital TV (LCD/OLE)	
	Audio/Projector	
	Set Top Box	
	Game Console	
	Drone	
	VR	
Enterprise 	Server	
	Multi Function Printer	
	Enterprise Display (LCD)	
	Smart Meter	
	Security (Camera/Home)	
	Amusement	
	POS/Handy Terminal	
Industrial 	Robotics	Ex.2) USB bus power line 
	PLC	
	Industrial PC	
	Production Equipment/Module	
Network 	Base Station (Wireless)	
	G-PON (Optical)	
	Switch/Router	

Part Numbering

(Part Number)

ECAS	D4	0D	227	M	009	K	00
❶	❷	❸	❹	❺	❻	❼	❽

❶Series

Product ID	
ECAS	Polymer Al Electrolytic Capacitor

❷Dimension (LxWxT) (mm)

Code	L	W	T
D3	7.3±0.3	4.3±0.2	1.4±0.1
D4	7.3±0.3	4.3±0.2	1.9±0.1
D6	7.3±0.3	4.3±0.2	2.8±0.3
D9	7.3±0.3	4.3±0.3	4.2±0.3

❸Rated Voltage

Code	Rated Voltage
0D	DC 2V
0E	DC 2.5V
0G	DC 4V
0J	DC 6.3V
0K	DC 8V
1A	DC 10V
1B	DC 12.5V
1C	DC 16V
1E	DC 25V

❹Capacitance
Expressed by three-digit numeric code. The unit is pico-farad (pF).
The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two numbers.
Ex.)

Code	Capacitance
476	47μF
107	100μF
227	220μF
477	470μF

❺Capacitance Tolerance

Code	Capacitance Tolerance
M	±20%

❻ESR
Expressed by three-digit alphanumerics. The unit is milli-ohm (mΩ).
If there is a decimal point, it is expressed by the capital letter "R".
Ex.)

Code	ESR
4R5	4.5mΩ
009	9mΩ
010	10mΩ

❼Packaging

Code	Packaging
K	ø330mm Embossed Taping

❽Individual Specification Code
Expressed by two figures.

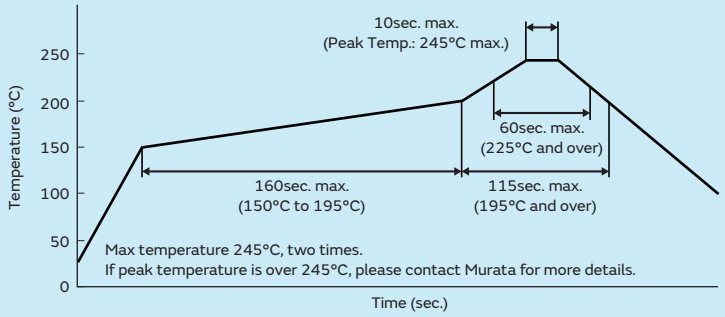
Specifications and Test Methods

No.	Item		Characteristics	Test Conditions
1	Operating Temperature Range		-40°C to +105°C	—
2	Leakage Current		≦The value of "Part Number Listing"	Series resistor : 1000 ohm Applied voltage: Rated Voltage Measuring after 2 minutes of application Please conduct pre-conditioning below, if you have a doubt. Pre-conditioning: Apply rated DC voltage for 1 hour at 105°C through 1000 ohm series resistor. Then discharge and keep in the room temperature for 4 to 24 hours.
3	Capacitance Tolerance		Please refer to "Part Number Listing"	Measuring frequency : 120Hz ±10% Measuring circuit : Equivalent series circuit Measuring voltage : +1Vr.m.s. Measuring temperature: 25°C
4	Dissipation Factor		≦0.06	
5	ESR		≦The value of "Part Number Listing"	Measuring frequency : 100kHz ±10% Measuring voltage : no more than +1Vr.m.s. Measuring temperature: 25°C
6	Allowable Ripple Current		Please refer to "Part Number Listing"	Measuring frequency: 100kHz ±10%
7	Solderability		More than 75% of each terminal face is covered by new solder	Lead Free Solder : Sn/3.0Ag/0.5Cu Flux : Rosin 25%, IPA 75% Solder temperature: 245 ±3°C Immersing time : 3 ±0.3s
8	Moisture Resistance Under No Bias	Leakage Current	≦750% of initial specified value for 2V to 10V products ≦300% of initial specified value for 12.5V to 25V products	Test temperature: 60±2°C Relative humidity: 90 to 95%RH Test time : 500+24, -0h
		Capacitance Change	-20% and +50% of initial measured value	
		Dissipation Factor	≦0.12	
		Appearance	No defects or abnormalities	
9	Moisture Resistance Under Load	Leakage Current	≦The value of "Part Number Listing"	Test temperature: 60±2°C Relative humidity: 90 to 95%RH Test time : 500+24, -0h Applied voltage : Rated Voltage
		Capacitance Change	-20% and +50% of initial measured value	
		Dissipation Factor	≦0.12	
		Appearance	No defects or abnormalities	
10	Shelf Life	Leakage Current	≦The value of "Part Number Listing"	Test temperature: 105±2°C Test time : 1000+48, -0h
		Capacitance Change	±10% of initial measured value	
		Dissipation Factor	≦0.06	
		Appearance	No defects or abnormalities	
11	Endurance	Leakage Current	≦The value of "Part Number Listing"	Test temperature: 105±2°C Test time : 2000+48, -0h Applied voltage : Rated Voltage
		Capacitance Change	±20% of initial measured value	
		Dissipation Factor	≦0.06	
		Appearance	No defects or abnormalities	
12	Surge	Leakage Current	≦The value of "Part Number Listing"	Temperature: +85°C for 2V to 10V products Room temp. for 12.5V to 25V products Applied voltage: Rated voltage x1.25 for 2V to 10V products Rated voltage x1.15 for 12.5V to 25V products Current limiting resistance: 33 ohm (in series) for 2V to 10V products 1k ohm (in series) for 12.5V to 25V products Discharge resistance: 33 ohm (in series) for 2V to 10V products 1k ohm (in series) for 12.5V to 25V products Charge on/off: 30 sec. each, 1000 times
		Capacitance Change	±10% of initial measured value	
		Dissipation Factor	≦0.06	
		Appearance	No defects or abnormalities	

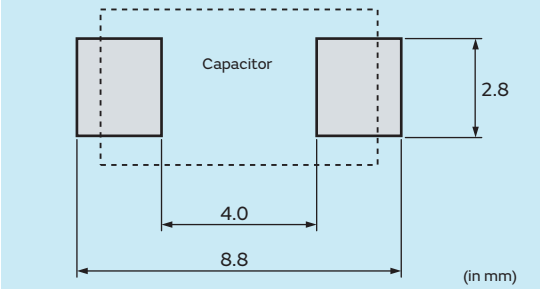
(The measurement condition in No.2 to 4 applies to No.8 to 12.)

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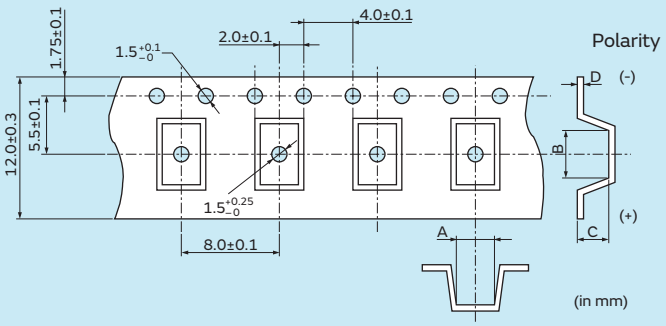
Recommended Reflow Profile

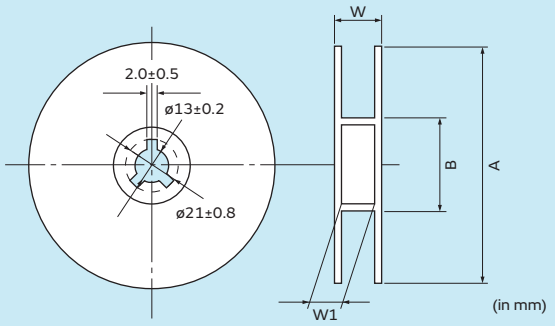


Land Pattern Design



Packaging





Case Size	Cavity Size (mm)				Minimum Qty. (pcs.)
	A*	B*	C*	D*	
D3, D4	4.60	7.65	2.16	0.23	3,000
D6	4.60	7.65	3.20	0.27	2,500
D9	4.45	7.65	4.55	0.28	2,000

* Nominal values

Reel Size	Tape Width	A	B	W	W1
ø330	12	330.0±2.0	100.0±1.0	17.4±1.5	13.4±1.5

Part Number Listing

Part Number	Rated Voltage (V.DC)	Cap. (µF)	Cap. Tolerance (%)	Case Size			ESR Max. (mΩ) 100kHz /+25°C	Leakage Current (µA)	Ripple Current (Arms) 100kHz /+105°C(*1)	Min. Packaging Quantity (pcs)
				Code	L x W (mm)	T (mm)				
ECASD40D107M016K00	2	100	±20	D4	7343	1.9	16	20.0	2.0	3,000
ECASD40D157M009K00	2	150	±20	D4	7343	1.9	9	30.0	3.0	3,000
ECASD40D227M009K00	2	220	±20	D4	7343	1.9	9	44.0	3.0	3,000
ECASD60D337M007K00	2	330	±20	D6	7343	2.8	7	66.0	3.5	2,500
ECASD60D477M4R5K00	2	470	±20	D6	7343	2.8	4.5	94.0	4.0	2,500
ECASD60D477M006K00	2	470	±20	D6	7343	2.8	6	94.0	3.5	2,500
ECASD90D567M4R5K00	2	560	±20	D9	7343	4.2	4.5	112.0	4.0	2,000
ECASD60E477M4R5K00	2.5	470	±20	D6	7343	2.8	4.5	117.5	4.0	2,500
ECASD60E477M006K00	2.5	470	±20	D6	7343	2.8	6	117.5	3.5	2,500
ECASD60E477M009K00	2.5	470	±20	D6	7343	2.8	9	117.5	3.0	2,500
ECASD40G686M020K00	4	68	±20	D4	7343	1.9	20	27.2	1.9	3,000
ECASD40G107M016K00	4	100	±20	D4	7343	1.9	16	40.0	2.1	3,000
ECASD40G157M016K00	4	150	±20	D4	7343	1.9	16	60.0	2.1	3,000
ECASD40G227M009K00	4	220	±20	D4	7343	1.9	9	88.0	3.0	3,000

(*1) Please refer to Cautions <6>② regarding this temperature.

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Part Number	Rated Voltage (V.DC)	Cap. (μF)	Cap. Tolerance (%)	Case Size			ESR Max. (mΩ) 100kHz /+25°C	Leakage Current (μA)	Ripple Current (Arms) 100kHz /+105°C(*1)	Min. Packaging Quantity (pcs)
				Code	L x W (mm)	T (mm)				
ECASD60G227M010K00	4	220	±20	D6	7343	2.8	10	88.0	3.0	2,500
ECASD90G337M008K00	4	330	±20	D9	7343	4.2	8	132.0	3.3	2,000
ECASD40J106M055K00	6.3	10	±20	D4	7343	1.9	55	6.3	1.0	3,000
ECASD40J226M045K00	6.3	22	±20	D4	7343	1.9	45	13.9	1.0	3,000
ECASD40J336M025K00	6.3	33	±20	D4	7343	1.9	25	20.8	1.8	3,000
ECASD40J476M025K00	6.3	47	±20	D4	7343	1.9	25	29.7	1.8	3,000
ECASD40J686M015K00	6.3	68	±20	D4	7343	1.9	15	42.9	2.0	3,000
ECASD40J107M015K00	6.3	100	±20	D4	7343	1.9	15	63.0	2.0	3,000
ECASD60J157M010K00	6.3	150	±20	D6	7343	2.8	10	94.5	3.0	2,500
ECASD60J227M010K00	6.3	220	±20	D6	7343	2.8	10	138.6	3.0	2,500
ECASD90J337M009K00	6.3	330	±20	D9	7343	4.2	9	207.9	3.4	2,000
ECASD41A106M055K00	10	10	±20	D4	7343	1.9	55	10.0	1.0	3,000
ECASD41A226M028K00	10	22	±20	D4	7343	1.9	28	22.0	1.6	3,000
ECASD41A336M025K00	10	33	±20	D4	7343	1.9	25	33.0	1.8	3,000
ECASD41A476M025K00	10	47	±20	D4	7343	1.9	25	47.0	1.8	3,000
ECASD61A686M015K00	10	68	±20	D6	7343	2.8	15	68.0	2.0	2,500
ECASD91A107M010K00	10	100	±20	D9	7343	4.2	10	100.0	3.0	2,000
ECASD91A157M010K00	10	150	±20	D9	7343	4.2	10	150.0	3.0	2,000
ECASD41B106M055K00	12.5	10	±20	D4	7343	1.9	55	12.5	1.0	3,000
ECASD41B156M045K00	12.5	15	±20	D4	7343	1.9	45	18.8	1.0	3,000
ECASD41B226M030K00	12.5	22	±20	D4	7343	1.9	30	27.5	1.6	3,000
ECASD41B336M025K00	12.5	33	±20	D4	7343	1.9	25	41.3	1.8	3,000
ECASD61B476M020K00	12.5	47	±20	D6	7343	2.8	20	58.8	2.0	2,500
ECASD61B566M020K00	12.5	56	±20	D6	7343	2.8	20	70.0	2.0	2,500
ECASD91B107M012K00	12.5	100	±20	D9	7343	4.2	12	125.0	2.5	2,000
ECASD41C685M070K00	16	6.8	±20	D4	7343	1.9	70	10.9	1.0	3,000
ECASD41C106M060K00	16	10	±20	D4	7343	1.9	60	16.0	1.0	3,000
ECASD41C156M040K00	16	15	±20	D4	7343	1.9	40	24.0	1.0	3,000
ECASD61C226M030K00	16	22	±20	D6	7343	2.8	30	35.2	1.6	2,500
ECASD41C336M040KA0	16	33	±20	D4	7343	1.9	40	158.4	1.6	3,000
ECASD31C476M040KA0	16	47	±20	D3	7343	1.5	40	225.6	1.6	3,000
ECASD41C476M040KA0	16	47	±20	D4	7343	1.9	40	225.6	1.6	3,000
ECASD41C686M040KA0	16	68	±20	D4	7343	1.9	40	326.4	1.6	3,000
ECASD41E106M040KA0	25	10	±20	D4	7343	1.9	40	75.0	1.6	3,000
ECASD41E156M040KA0	25	15	±20	D4	7343	1.9	40	112.5	1.6	3,000
ECASD41E226M040KA0	25	22	±20	D4	7343	1.9	40	165.0	1.6	3,000

(*1) Please refer to Cautions <6>② regarding this temperature.

Cautions for Use

Cautions

<1> Prohibited Circuits For Use
Do not use the capacitor with the following circuits.
①Time-constant circuit ②Coupling circuits ③2 or more capacitors connected serially
④Circuit which are greatly affected by leakage current

<2> Polarity
Polymer aluminum electrolytic capacitor is polarized. Please not to reverse the polarity when using.
If reverse voltage is applied even momentary, it may damage the oxide film and the capacitor itself.

<3> Operating Voltage
When DC-rated capacitors are to be used in AC or ripple current circuits, be sure to maintain the Vp-p value of the applied voltage or the Vo-p which contains DC bias within the rated voltage range.
When the voltage is applied to the circuit, starting or stopping may generate irregular voltage for a transit period because of resonance or switching. Be sure to use a capacitor with a rated voltage range that includes these irregular voltages.

<4> Inrush Current
Extreme inrush current may cause short circuit or leakage current increase. If the inrush current exceeds 20A, adding protection circuit is recommended.

<5> Allowable Ripple Current
Please not to apply ripple current exceeding the allowable value specified in this document. If excessive current is applied, it may generate heat and the heat may damage the capacitor.
The sum of DC voltage and the peak AC voltage shall not exceed the rated voltage. The sum of the DC voltage and the peak AC voltage shall not allow a voltage reversal.

<6> Operating Temperature
The operating temperature limit depends on the capacitor.
①Do not apply temperature exceeding the upper operating temperature. It is necessary to select a capacitor with a suitable rated temperature that will cover the operating temperature range. Also it is necessary to consider the temperature distribution in equipment and the seasonal temperature variable factor.
②Consider the self-heating of the capacitor. The surface temperature of the capacitor shall be the upper operating temperature or less when including the self-heating factors.

<7> Reflow Soldering
Please not to 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.

<8> Conditions for soldering with iron Temperature of iron tip: 350 ±5°C max. (70W max.)
Soldering time: Within 3 sec. for each terminal Times: 1 time only for each terminal
Please do not touch the capacitor body with iron or apply excessive force to the capacitor while soldering.
Do not reuse the capacitor once removed from a printed circuit board.

<9> Operating Environment
Confirm the environment in which the equipment will operate is under the specified conditions. Do not use the equipment under the following environments.
①Being spattered with water or oil. ②Being exposed to direct sunlight. ③Being exposed to Ozone, ultraviolet rays or radiation.
④Being exposed to toxic gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas, etc.)
⑤Being exposed to excessive vibrations or mechanical shocks. ⑥Being exposed to condensable environments.

Storage Conditions

<1> Term of warranty for this product is two years after packaging in a moisture-proof bag, under the conditions below with sealed packaging.
Recommended storage environment Room temperature: 5-30°C Humidity: no more than 60%RH

<2> Polymer aluminum electrolytic capacitors should not be stored in an atmosphere consisting of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas, etc.).

<3> Polymer aluminum electrolytic capacitors should be stored in a dry atmosphere, avoiding direct sunlight and condensation. If capacitors are kept at a higher humidity, the following problems may occur:
①Leakage current will increase at the beginning of use and damage the circuit.
②Moisture absorbed in a resin will evaporate and expand with heat of mounting and damage the mold resin.

<4> Please confirm a dry state with a humidity indicator card after open immediately. If 20% indication was in a pink state after opened, it is recommended to bake under the conditions below.

<5> The capacitors should be kept dry using desiccators or any other methods after unsealing the moisture-proof packaging. If more than one week has passed under the recommended storage environment specified above after unsealing the packaging, it is recommended to bake under the conditions below.
Recommended baking conditions Temperature: 60 (+0, -5) °C Time: 168 hours

<6> This product meets MSL-3.

EU RoHS Compliant

- All the products in this catalog comply with EU RoHS.
- EU RoHS is "the European Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment."
- For more details, please refer to our website 'Murata's Approach for EU RoHS' (http://www.murata.com/en-us/support/compliance/rohs).

Global Locations

For details please visit www.murata.com



⚠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 customers in Japan:

For products which are controlled items subject 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.

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*

3 Product specifications in this catalog are as of March 2018. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering. If there are any questions, please contact our sales representatives or product engineers.

4 Please read rating and ⚠CAUTION (for storage, operating, rating, soldering, mounting and handling) in this catalog to prevent smoking and/or burning, etc.

5 This catalog has only typical specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.

6 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.

7 No ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.

Murata Manufacturing Co., Ltd.

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INNOVATOR IN ELECTRONICS

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