



*ALUMINUM ELECTROLYTIC CAPACITORS
(E-Cap SMD)*



GENERAL INFORMATION FOR APPLICATION

The following precautions must be observed when using electrolytic capacitors.

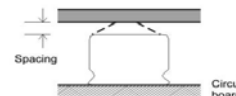
1. Circuit Design

- (1) Please make sure that the environmental and mounting conditions to which the capacitor to be exposed are within the conditions specified in this catalogue.
- (2) Operating temperature and applied ripple must be within the specifications.
 - ① The capacitors shall not be used in an ambient temperature which exceeds the operating temperature specified in the specification.
 - ② Do not apply excessive current which exceeds the allowable ripple current.
- (3) Appropriate capacitors which comply with the life requirement of the products, should be selected when designing the circuit.
- (4) Aluminum electrolytic capacitors are polarized. Make sure that no reverse voltage or AC voltage is applied to the capacitors. Please use non-polarized capacitors for a circuit that can possibly see reserved polarity.
Note: Even non-polarized capacitors cannot be used for AC voltage application.
- (5) For a circuit that repeats rapid charging/discharging of electricity, an appropriate capacitor that is capable of enduring such a condition must be used. Welding machines and photo flash are a few examples of products that contain such a circuit.
For appropriate choice of capacitors for circuit that repeat rapid charging /discharging, please consult us.
- (6) Make sure that no excess voltage (that is higher than the rated voltage) is applied to the capacitor.
 - ① Please pay attention so that the peak voltage, which is DC voltage overlapped by ripple current, should not exceed the rated voltage.
 - ② In the case where more than two aluminum electrolytic capacitors are used in series, please make sure that applied voltage should be lower than rated voltage and the voltage should be applied to each capacitor equally using a balancing resistor in parallel with the capacitor.
- (7) Outer sleeve of the capacitor is not guaranteed as an electrical insulator. Do not use standard sleeve on a capacitor in applications that require electrical insulation. When the application requires special insulation, please contact our sales office for details.
- (8) Capacitors may fail if they are used under the following conditions:
 - ① Environmental (climatic) conditions
 - (a) Being exposed to water, high temperature & high humidity atmosphere, or condensation of moisture.
 - (b) Being exposed to oil or an atmosphere that is filled with particles of oil.
 - (c) Being exposed to salty water or an atmosphere that is filled with particles of salt.
 - (d) In an atmosphere filled with toxic gases (such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, bromine, methyl bromide, ammonia, etc.)
 - (e) Being exposed to direct sunlight, ozone, ultraviolet ray, or radiation.
 - (f) Being exposed to acidic or alkaline solutions.
 - ② Severe vibration and physical shock conditions that exceed our specification.
Vibration test condition:

Vibration frequency range:	10 ~ 55 ~ 10HZ
Sweep rate	: 10 ~ 55 ~ 10HZ/minute
Sweep method	: logarithmic
Amplitude or acceleration:	1.5mm (maximum acceleration is 10G)
Direction of vibration	: X, Y, Z direction
Testing time	: 2 hours per each direction

 Shock is not applicable normally.
If a particular condition is required, please contact our sales office.
- (9) When designing a circuit board, please pay attention to the following:
 - ① Have the hole spacing on the P.C. board match the lead spacing of the capacitor.
 - ② There should not be any circuit pattern or circuit wire above the capacitor safety vent.
 - ③ Unless otherwise specified, following clearance should be made above the pressure relief vent.

Case Diameter	Clearance Required
φ6.3 to 16	2mm or more
φ18 to 35	3mm or more
φ40 or more	5mm or more
 - ④ In case the vent side is placed toward P.C. board (such as end seal vented parts), make a corresponding hole on the P.C. board to release the gas when vent is operated. The hole should be made to match the capacitor vent position.
- (10) The main chemical solution of the electrolyte and the separator paper in the capacitor are combustible. The electrolyte is conductive. When it comes in contact with the P.C. board, there is a possibility of pattern or short circuit between the circuit pattern, which could result in smoking or fire. Do not locate any circuit pattern beneath the capacitor end seal.
- (11) Do not design a circuit board so that heat generating components are placed near an aluminum electrolytic capacitor or reverse Side of P.C. board (under the capacitor).
- (12) Please refer to the recommended land size in this catalogue when you design in surface mount capacitors.
- (13) Electrical characteristics may vary depending on changes in temperature and frequency. Please consider the variation when you design circuit.



- (14) When you install more than 2 capacitors in parallel, consider the balance of current flowing in to the capacitor.
- (15) While mounting capacitors on double side P.C. board, the capacitors should be away from those unnecessary base plate holes and connection holes.

2. Mounting

- (1) Once a capacitor has been assembled in the set and power applied, do not attempt to re-use the capacitor in other circuits or application.
- (2) Electric potential between positive and negative terminal may exist as a result of returned electromotive force, so please discharge the capacitor using 1k Ω resistor.
- (3) Please confirm ratings and polarity before installing capacitor on the P.C. board.
- (4) Do not drop the capacitors on the floor, nor use a capacitor that was dropped.
- (5) Be careful not to deform the capacitor during installation.
- (6) Please confirm that the lead spacing of the capacitor matches the pad spacing of the P.C. board prior to installation.
- (7) Please pay attention that the clinch force is not too strong when capacitors are placed and fixed by an automatic insertion machine.
- (8) Please pay attention to the mechanical shock to the capacitor by suction nozzle of the automatic insertion machine or automatic mounted, or by product checker, or by centering mechanism.
- (9) Hand soldering:
 - ① Solder condition shall be confirmed to be within the specifications.
 - ② If it is necessary that the leads must be formed due to a mismatch of the lead space to hole space on the board, bend the lead prior to soldering without applying too much stress to the capacitor.
 - ③ If you need to remove parts which were soldered, please melt the solder enough so that stress is not applied to lead.
 - ④ Please pay attention so that solder iron does not touch any portion of capacitor body.
- (10) Flow soldering (wave solder):
 - ① Aluminum capacitor body must not be submerged into the solder bath.
 - ② Soldering condition must be confirmed to be within specification.
 - ③ Please avoid having flux adhere to any portion except the terminal.
 - ④ Please avoid contact between other components and the aluminum capacitor.
- (11) Reflow soldering (SMD only):
 - ① Please follow "Reflow Soldering Condition" in this catalogue.
 - ② When an infrared heater is used, please pay attention to the extent of heating, since the absorption rate of infrared, will vary due to difference in the color and size of the capacitor.
- (12) Do not tilt lay down or twist the capacitor body after the capacitor are soldered to the P.C. board.
- (13) Do not carry the P.C. board by grasping the soldered capacitor.
- (14) Please do not allow anything to touch the capacitor after soldering. If P.C. board are stored in stack, please make sure P.C. board or the other components do not touch the capacitor. The capacitor shall not be effected by any radiated heat from the soldered P.C. board or other components after soldering.
- (15) Cleaning
 - ① Do not clean capacitors with halogenated cleaning agent. However, if it is necessary to clean with halogenated cleaning agent, please contact our sales office.
 - ② Recommended cleaning method:
 - Applicable: Any type, any ratings
 - Cleaning agents:
 - Based alcohol solvent cleaning agent: Isopropyl Alcohol Based
 - water solvent cleaning agent:
 - Premium alcohol solvent type: Pine Alpha ST-100S, Techno Care FRW14 ~ 17, Sanelek B-12
 - Surfactant type: Clean through 750H/750L/710M Alkaline
 - saponification agent: Aqua cleaner 210SEP
 - Cleaning conditions:
 - Total cleaning time shall be within 5 minutes by immersion, ultrasonic or other method. Temperature of the cleaning agent shall be 60 $^{\circ}$ C or lower. After cleaning, capacitors should be dried using hot air for minimum of 10 minutes along with the P.C. board. Hot air temperature should be below the maximum operating temperature of the capacitor. Insufficient dry after water rinse may cause appearance problems, sleeve shrink, bottom-plate bulge and such.
 - ③ Avoid using ozone destructive substances for cleaning agents to concern about global environment.
- (16) Fixing Material and Coating Material
 - ① Do not use any affixing or coating materials, which contain halide substance.
 - ② Remove flux and any contamination, which remains in the gap between the end seal and P.C. board.
 - ③ Please dry the cleaning agent on the P.C. board before using affixing or coating materials.
 - ④ Please do not apply any material all around the end seal when using affixing or coating materials.
 - There are variations of cleaning agents, fixing and coating materials, so please contact those manufactures or our sales office to make sure that the material would not cause any problems.

(17) Other

Wooden package material may be subjected to fumigation by a halogen (e.g. methyl bromide) before they are exported in order to protect them against pests. If devices with aluminum electrolytic capacitors or capacitors themselves are fumigated or packed with the pallet that is fumigated, the capacitors may internally corrode due to the halogen contents of fumigation agents.

3. In The Equipment

- (1) Do not directly touch terminal by hand.
- (2) Do not short between terminals by conductor, nor spill conductible liquid such as alkaline or acidic solution on or near the capacitor
- (3) Please make sure that the ambient conditions where the set is installed don't have any of the following conditions:
 - ① Where capacitors are exposed to water, high temperature & high humidity atmosphere, or condensation of moisture.
 - ② Where capacitors are exposed to oil or an atmosphere that is filled with particles of oil.
 - ③ Where capacitors are exposed to salty water, high temperature & high humidity atmosphere, or condensation of moisture.
 - ④ The atmosphere is filled with toxic acid gasses (e.g. hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, bromine, methyl bromide, etc.).
 - ⑤ The atmosphere is filled with toxic alkaline gasses (e.g. ammonia).
 - ⑥ Where capacitors are exposed to acidic or alkaline solutions.
 - ⑦ Since shrinkage, bulging and/or crack could be seen on outer sleeve of capacitor when capacitors are used in atmosphere where condensation of moisture occurs, please confirm their adaptation before the use. The condensation of moisture could occur when temperature cycling test/rapid change of temperature test is performed, in this case, aforementioned sleeve problem could be seen.

4. In The Equipment

Please periodically inspect the aluminum capacitors that are installed in industrial equipment. The following items should be checked:

- (1) Appearance: Remarkable abnormality such as vent operation, leaking electrolyte etc.
- (2) Electrical characteristic: Capacitance, dielectric loss tangent, leakage current etc., which are specified in this catalogue.

5. In an Emergency

- (1) If you see smoke due to operation of safety vent, turn off the main switch or pull out the plug from the outlet.
- (2) Do not draw your face to the safety vent since gas over 100°C will be emitted when the safety vent operates. If the gas has entered your eyes, please flush your eyes immediately in pure water. If you breathed the gas immediately wash out your mouth and throat with water.
- (3) Do not ingest electrolyte. If your skin is exposed to electrolyte, please wash it away using soap and water.

6. Storage

- (1) Do not keep capacitor in high temperature and high humidity. Storage conditions should be:
 - Temperature : +5°C ~ +35°C
 - Humidity : lower than 75%
 - Place : Indoor
- (2) Avoid ambient conditions where capacitors can be covered with water, brine or oil.
- (3) Avoid ambient conditions where capacitors are exposed to poisonous gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonium etc.
- (4) Do not keep capacitor in conditions that expose the capacitor to ozone, ultraviolet ray or radiation.
- (5) Store capacitors in a packed condition as much as possible.

7. Disposal

- (1) Please dispose capacitors in either of the following ways:
 - ① Incinerate (at a temperature of 800°C or higher) capacitors after crushing parts or making a hole on the capacitor body.
 - ② If incineration is not applicable, hand them over to a waste disposal agent and have them buried in a landfill.
- (2) When removing a capacitor from the circuit board or when disposing of capacitor, please ensure that the capacitor is properly discharged.

8. Others

- (1) The products meet or exceed quality standards specified by JIS-C-5141 and with the reliability requirements refer to JIS-C-5101.
- (2) None of zone depleting chemicals (ODC) under the Montreal Protocol is used in our manufacturing process.

NOTE: All designs and specifications are for reference only and are subject to change without prior notice. If any doubt about safety for your application, please contact us immediately for technical assistance before purchas



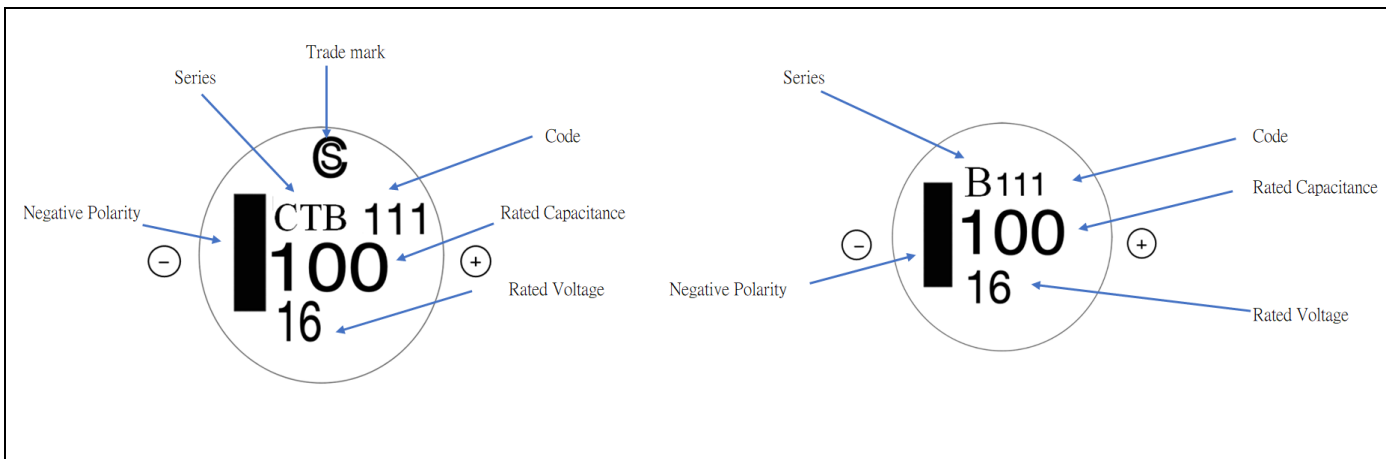
Capacitor Series Table

Series	Page	Features	Voltage Range (Vdc)	Capacitance Range (μF)	Operating Temperature Range (°C)	Endurance (Hours)	
E-CAP	CTB	4	105°C Standard	4 to 100	2.2 to 6,800	-40~105°C	1,000 to 2,000
	CTC	8	105°C Long life	6.3 to 100	3.3 to 3,300	-55~105°C	3,000 to 5,000
	CTF	11	105°C High voltage, Long life	160 to 450	2.2 to 47	-40~105°C	3,000 to 5,000
	CES	13	105°C Low impedance	6.3 to 50	1 to 3,300	-55~105°C	1,000 to 2,000
	CED	16	105°C Extra low impedance	6.3 to 50	10 to 3,300	-55~105°C	2,000 to 3,000
	CEE	19	105°C Extra low impedance, Long life	50 to 100	4.7 to 470	-55~105°C	2,000 to 5,000
	CHJ	22	125°C High temperature, Long life	10 to 450	3.3 to 1,000	-40~125°C	1,000 to 5,000
	CSN	25	105°C Bi-polar	6.3 to 50	0.1 to 100	-40~105°C	1,000

ALUMINUM ELECTROLYTIC CAPACITORS



◆ MARKING AND DATE CODE



Trade Mark "CS"	<u>Chinsan mark, Show on Dimension $\geq 8 \Phi$</u>																																																						
Code (Date Code)	<p>(1)DAY</p> <table border="1"> <thead> <tr> <th>Code</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>Week</td> <td>The first week</td> <td>The second week</td> <td>The third week</td> <td>The fourth week</td> <td>The fifth week</td> </tr> </tbody> </table> <p>(2)Month</p> <table border="1"> <thead> <tr> <th>Code</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> </tr> </thead> <tbody> <tr> <td>Month</td> <td>Jan</td> <td>Feb</td> <td>Mar</td> <td>Apr</td> <td>May</td> <td>Jun</td> </tr> <tr> <td>Code</td> <td>7</td> <td>8</td> <td>9</td> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>Month</td> <td>July</td> <td>Aug</td> <td>Sep</td> <td>Oct</td> <td>Nov</td> <td>Dec</td> </tr> </tbody> </table> <p>(3)Year</p> <table border="1"> <thead> <tr> <th>Code</th> <th>9</th> <th>0</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>Year</td> <td>2019</td> <td>2020</td> <td>2021</td> <td>2022</td> <td>2023</td> <td>2024</td> </tr> </tbody> </table>	Code	1	2	3	4	5	Week	The first week	The second week	The third week	The fourth week	The fifth week	Code	1	2	3	4	5	6	Month	Jan	Feb	Mar	Apr	May	Jun	Code	7	8	9	X	Y	Z	Month	July	Aug	Sep	Oct	Nov	Dec	Code	9	0	1	2	3	4	Year	2019	2020	2021	2022	2023	2024
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PART NUMBER SYSTEM

◆ E-Cap SMD TYPE

Series	Rated Voltage	Capacitance	Tolerance	Lead Forming Type	Lead Length	Case Dimension	Special Request
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

(1) Series

Series	CTB	CTC	CTF	CES	CED	CEE	CHJ	CSN
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(2) Rated Voltage

Code	0G	0J	1A	1C	1E	1V	1H	1J	1K	2A	2C	2D	2E	2G	2W
WV	4	6.3	10	16	25	35	50	63	80	100	160	200	250	400	450

(3) Capacitance

Code	2R2	4R7	100	150	220	151	561	102	332
μF	2.2	4.7	10	15	22	150	560	1000	3300

(4) Capacitance Tolerance

Code	J	Q	R	K	V	M	H
%	± 5	+30 / -10	+20 / -0	± 10	+20 / -10	± 20	+20 / -5

(5) Lead Type

Code	C
Description	Cutting

(6) Lead Length

Code	B			
∅D	6.3	8.0*	10.0	12.0
Description	2.6	3.2	3.2	4.6

*08A5 Lead Length "3.0"

(7) Case Dimension

Code	6358	6377	63A5	0862	08A5	08C5	10A5	10C5	12D5	1216
Size	6.3x5.8	6.3x7.7	6.3x10.5	8x6.2	8x10.5	8x12.5	10x10.5	10x12.5	12.5x13.5	12.5x16

(8) Special Request

Code	R	F
Description	High Rated ripple current	Endurance

ALUMINUM ELECTROLYTIC CAPACITORS



CTB Series

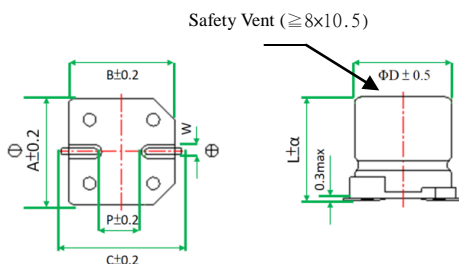
- Standard Series at 105°C
- Load life 2,000 hours at 105°C



◆ SPECIFICATIONS

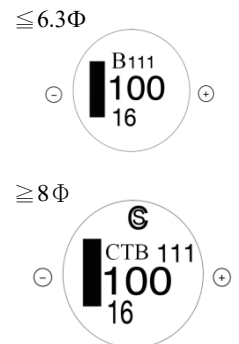
Item	Performance Characteristics																																											
Category Temperature Range	-40 ~ +105°C																																											
Working Voltage Range	4 ~ 100Vdc																																											
Capacitance Range	2.2 ~ 6,800 μF																																											
Capacitance Tolerance	±20% (at 25°C and 120Hz)																																											
Dissipation Factor (tanδ) (at 25°C, 120Hz)	<table border="1"> <thead> <tr> <th>Rated Voltage (V)</th> <th>4</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>100</th> </tr> </thead> <tbody> <tr> <td rowspan="2">tanδ(Max)</td> <td>∅6.3~∅10</td> <td>0.35</td> <td>0.30</td> <td>0.24</td> <td>0.20</td> <td>0.16</td> <td>0.14</td> <td>0.14</td> <td>0.12</td> <td>0.12</td> </tr> <tr> <td>∅12.5</td> <td>0.42</td> <td>0.38</td> <td>0.34</td> <td>0.30</td> <td>0.26</td> <td>0.22</td> <td>0.18</td> <td>0.14</td> <td>0.12</td> </tr> </tbody> </table>	Rated Voltage (V)	4	6.3	10	16	25	35	50	63	100	tanδ(Max)	∅6.3~∅10	0.35	0.30	0.24	0.20	0.16	0.14	0.14	0.12	0.12	∅12.5	0.42	0.38	0.34	0.30	0.26	0.22	0.18	0.14	0.12												
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The above values should be increased by 0.02 for every additional 1000μF																																												
Leakage Current	(∅6~∅10) I=0.01CV or 3μA whichever is greater impress the rated voltage for 2 minutes. (∅12.5) I=0.03CV or 4μA whichever is greater impress the rated voltage for 1 minute. I : Leakage current (μA) C : Rated capacitance (μF) V : Rated voltage (V)																																											
Low Temperature Characteristics Impedance Ratio(MA×)	<table border="1"> <thead> <tr> <th>Rated voltage (V)</th> <th>4</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50~63</th> <th>100</th> </tr> </thead> <tbody> <tr> <td rowspan="2">∅6.3~∅10</td> <td>Z(-25°C)/Z(+20°C)</td> <td>7</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>3</td> </tr> <tr> <td>Z(-40°C)/Z(+20°C)</td> <td>15</td> <td>8</td> <td>6</td> <td>4</td> <td>4</td> <td>3</td> <td>4</td> </tr> <tr> <td rowspan="2">∅12.5</td> <td>Z(-25°C)/Z(+20°C)</td> <td>7</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z(-40°C)/Z(+20°C)</td> <td>17</td> <td>12</td> <td>10</td> <td>8</td> <td>5</td> <td>4</td> <td>3</td> </tr> </tbody> </table>	Rated voltage (V)	4	6.3	10	16	25	35	50~63	100	∅6.3~∅10	Z(-25°C)/Z(+20°C)	7	4	3	2	2	2	3	Z(-40°C)/Z(+20°C)	15	8	6	4	4	3	4	∅12.5	Z(-25°C)/Z(+20°C)	7	5	4	3	2	2	2	Z(-40°C)/Z(+20°C)	17	12	10	8	5	4	3
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(at 120Hz)																																												
Endurance	The following specifications shall be satisfied when the capacitor are restored to 25°C after subjected to DC voltage with the rated voltage is applied for 2,000 hours (∅6.3×5.8 for 1,000 hours) at 105°C																																											
	<table border="1"> <tbody> <tr> <td>Capacitance change</td> <td>≒ ±20% of the initial value (≒ ±30% of the initial value of 4V or less)</td> </tr> <tr> <td>Dissipation factor(tanδ)</td> <td>≒ 200% of the specified value</td> </tr> <tr> <td>Leakage current</td> <td>≒ specified value</td> </tr> </tbody> </table>	Capacitance change	≒ ±20% of the initial value (≒ ±30% of the initial value of 4V or less)	Dissipation factor(tanδ)	≒ 200% of the specified value	Leakage current	≒ specified value																																					
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Leakage current	≒ specified value																																											
Shelf Life	The following requirements shall be satisfied when the capacitor are restored to 25°C after exposing them for 1,000 hours at 105°C without voltage applied.																																											
	<table border="1"> <tbody> <tr> <td>Capacitance change</td> <td>≒ ±20% of the initial value (≒ ±30% of the initial value of 4V or less)</td> </tr> <tr> <td>Dissipation factor(tanδ)</td> <td>≒ 200% of the specified value</td> </tr> <tr> <td>Leakage current</td> <td>≒ 200% of the specified value</td> </tr> </tbody> </table>	Capacitance change	≒ ±20% of the initial value (≒ ±30% of the initial value of 4V or less)	Dissipation factor(tanδ)	≒ 200% of the specified value	Leakage current	≒ 200% of the specified value																																					
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Dissipation factor(tanδ)	≒ 200% of the specified value																																											
Leakage current	≒ 200% of the specified value																																											
Others	Conforms to JIS-C-5101-4 (1998), characteristic W																																											

◆ DIMENSIONS (mm)



Code	Size	ΦD	L	α	A	B	C	W	P
6358	6.3×5.8	6.3	5.8	+0.4 -0.1	6.6	6.6	7.3	0.5~0.8	2.1
6377	6.3×7.7	6.3	7.7	±0.3	6.6	6.6	7.3	0.5~0.8	2.1
0862	8×6.2	8	6.2	+0.4 -0.1	8.3	8.3	8.8	0.5~0.8	2.2
08A5	8×10.5	8	10.5	0.5	8.3	8.3	9.1	0.8~1.2	3.1
10A5	10×10.5	10	10.5	0.5	10.3	10.3	11	0.8~1.2	4.6
10C5	10×12.5	10	12.5	0.5	10.3	10.3	11	0.8~1.2	4.6
12D5	12.5×13.5	12.5	13.5	1.0	12.8	12.8	13.8	0.8~1.2	4.6
12I6	12.5×16	12.5	16	1.0	12.8	12.8	13.8	0.8~1.2	4.6

◆ Marking





CTB Series

◆ Case size & Permissible rated ripple current

Nominal Capacitance (μF)	4V		6.3V		10V		16V		25V	
	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)
22									6.3×5.8	36
33							6.3×5.8	40	6.3×5.8	44
47					6.3×5.8	41	6.3×5.8	48	6.3×5.8	48
100	6.3×5.8	60	6.3×5.8	50	6.3×5.8	53	6.3×5.8	60	6.3×7.7	91
							8×6.2	120		
150	6.3 × 5.8	52	6.3×5.8	55	6.3×5.8	62	6.3×7.7	95	6.3×7.7	100
									8×10.5	140
220	6.3×5.8	57	6.3×5.8	67	6.3×5.8	85	6.3×7.7	105	8×10.5	175
			6.3×7.7	105	6.3×7.7	105	8×6.2	85		
					8×6.2	105	8×10.5	150		
330	6.3×7.7	100	6.3×7.7	105	6.3×7.7	105	8×10.5	195	8×10.5	220
					8×10.5	196			10×10.5	240
470	6.3×7.7	105	6.3×7.7	120	8×10.5	210	8×10.5	230	10×10.5	280
			8×10.5	210	10×10.5	260	10×10.5	295		
560									10×10.5	320
680	8×10.5	210	8×10.5	210	10×10.5	270	10×10.5	315	10×12.5	400
1000	8×10.5	230	8×10.5	230	10×10.5	315	10×10.5	340	12.5×13.5	580
			10×10.5	300			10×12.5	390		
							12.5×13.5	500		
1500	10×10.5	315	10×10.5	315	10×12.5	460	12.5×13.5	550	12.5×16	850
			10×12.5	450						
2200	10×10.5	340	10×12.5	500	12.5×13.5	680	12.5×16	750		
	10×12.5	440	12.5×13.5	620						
3300	10×12.5	490	12.5×13.5	660						
			12.5×16	700						
4700	12.5×13.5	600								
6800	12.5×16	650								

CTB Series

◆ Case size & Permissible rated ripple current

Nominal Capacitance (μF)	35V		50V		63V		100V	
	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)
2.2							6.3×5.8	14
3.3							6.3×5.8	20
							6.3×7.7	32
							8×6.2	30
4.7							6.3×5.8	21
							6.3×7.7	35
10			6.3×5.8	24	6.3×5.8	24	6.3×7.7	35
					6.3×7.7	39		
					8×6.2	25		
22	6.3×5.8	38	6.3×5.8	42	6.3×7.7	49	8×10.5	84
			6.3×7.7	51				
			8×6.2	70				
33	6.3×5.8	42	6.3×7.7	60	8×10.5	112	10×10.5	133
	8×6.2	84						
47	6.3×5.8	50	6.3×7.7	63	8×10.5	119	10×10.5	140
	6.3×7.7	70	8×10.5	120	10×10.5	160	10×12.5	160
							12.5×13.5	250
56					8×10.5	120		
					10×10.5	165		
68							10×12.5	180
							12.5×13.5	300
100	6.3×7.7	84	8×10.5	140	10×10.5	196	12.5×13.5	380
	8×10.5	120			10×12.5	210		
					12.5×13.5	270		
150	8×10.5	155	10×10.5	170	10×12.5	225		
	8×10.5	190	10×10.5	220	12.5×13.5	470		
10×10.5	220	10×12.5	280					
330	10×10.5	245	10×12.5	295	12.5×16	510		
			12.5×13.5	420				
470	10×10.5	280	12.5×16	420				
	10×12.5	375						
	12.5×13.5	520						
680	10×12.5	395						
	12.5×13.5	530						
1000	12.5×16	600						

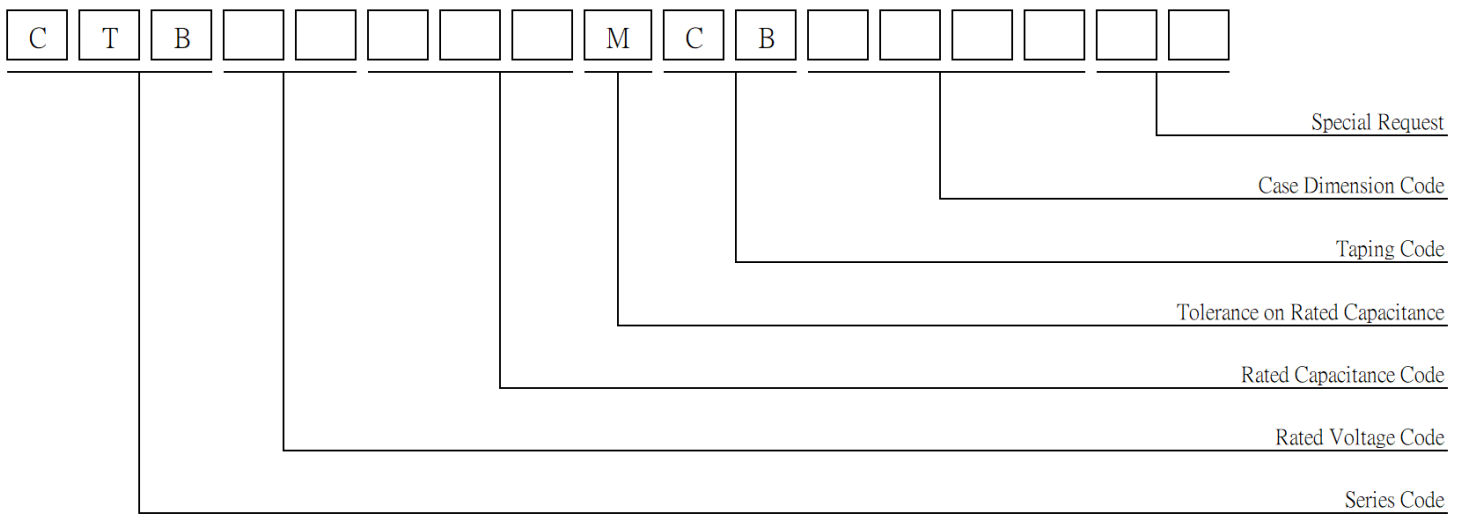
CTB Series

◆ RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Size	Cap(μF)	Frequency (Hz)				
		50	120	300	1K	10K~
Ø6.3~Ø10	2.2~68	0.70	1.00	1.17	1.36	1.50
	100~3300	0.85	1.00	1.08	1.20	1.30
Ø12.5	~68	0.75	1.00	1.35	1.57	2.00
	100~680	0.80	1.00	1.23	1.34	1.50
	1000~6800	0.85	1.00	1.10	1.13	1.15

◆ PART NUMBERING SYSTEM



ALUMINUM ELECTROLYTIC CAPACITORS



CTC Series

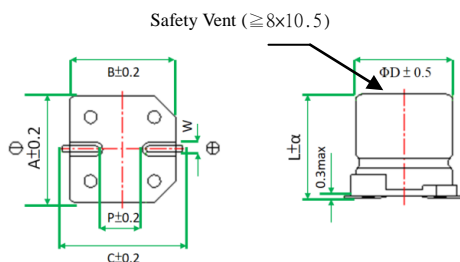
- Long life 3,000~5,000 hours at 105°C



◆ SPECIFICATIONS

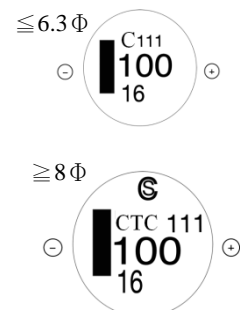
Item	Performance Characteristics																																						
Category Temperature Range	-55 ~ +105°C																																						
Working Voltage Range	6.3 ~ 100Vdc																																						
Capacitance Range	3.3 ~ 3300 μF																																						
Capacitance Tolerance	±20% (at 25°C and 120Hz)																																						
Dissipation Factor (tanδ) (at 25°C, 120Hz)	<table border="1"> <thead> <tr> <th>Rated Voltage (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>100</th> </tr> </thead> <tbody> <tr> <td rowspan="2">tanδ(Max)</td> <td>∅6.3~∅10</td> <td>0.28</td> <td>0.24</td> <td>0.20</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.12</td> <td>0.12</td> </tr> <tr> <td>∅12.5</td> <td>0.38</td> <td>0.34</td> <td>0.30</td> <td>0.26</td> <td>0.22</td> <td>0.18</td> <td>0.18</td> <td>0.18</td> </tr> </tbody> </table>	Rated Voltage (V)	6.3	10	16	25	35	50	63	100	tanδ(Max)	∅6.3~∅10	0.28	0.24	0.20	0.16	0.14	0.12	0.12	0.12	∅12.5	0.38	0.34	0.30	0.26	0.22	0.18	0.18	0.18										
	Rated Voltage (V)	6.3	10	16	25	35	50	63	100																														
tanδ(Max)	∅6.3~∅10	0.28	0.24	0.20	0.16	0.14	0.12	0.12	0.12																														
	∅12.5	0.38	0.34	0.30	0.26	0.22	0.18	0.18	0.18																														
The above values should be increased by 0.02 for every additional 1000μF																																							
Leakage Current	(∅6.3~∅10) I=0.01CV or 3μA whichever is greater impress the rated voltage for 2 minutes. (∅12.5) I=0.03CV or 4μA whichever is greater impress the rated voltage for 1 minutes. I : Leakage current (μA) C : Rated capacitance (μF) V : Rated voltage (V)																																						
Low Temperature Characteristics Impedance Ratio(MA×)	<table border="1"> <thead> <tr> <th colspan="2">Rated voltage (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50~100</th> </tr> </thead> <tbody> <tr> <td rowspan="2">∅6.3~∅10</td> <td>Z(-25°C)/Z(+20°C)</td> <td>3</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z(-55°C)/Z(+20°C)</td> <td>8</td> <td>5</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> </tr> <tr> <td rowspan="2">∅12.5</td> <td>Z(-25°C)/Z(+20°C)</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z(-55°C)/Z(+20°C)</td> <td>12</td> <td>10</td> <td>8</td> <td>5</td> <td>4</td> <td>3</td> </tr> </tbody> </table>	Rated voltage (V)		6.3	10	16	25	35	50~100	∅6.3~∅10	Z(-25°C)/Z(+20°C)	3	3	2	2	2	2	Z(-55°C)/Z(+20°C)	8	5	4	3	3	3	∅12.5	Z(-25°C)/Z(+20°C)	5	4	3	2	2	2	Z(-55°C)/Z(+20°C)	12	10	8	5	4	3
	Rated voltage (V)		6.3	10	16	25	35	50~100																															
∅6.3~∅10	Z(-25°C)/Z(+20°C)	3	3	2	2	2	2																																
	Z(-55°C)/Z(+20°C)	8	5	4	3	3	3																																
∅12.5	Z(-25°C)/Z(+20°C)	5	4	3	2	2	2																																
	Z(-55°C)/Z(+20°C)	12	10	8	5	4	3																																
(at 120Hz)																																							
Endurance	The following specifications shall be satisfied when the capacitors are restored to 25°C after subjected to DC voltage with the rated voltage is applied for 5,000 hours (∅6.3×5.8 ~ ∅8×6.2 for 3,000 hours) at 105°C																																						
<table border="1"> <tbody> <tr> <td>Capacitance change</td> <td>≅ ±30% of the initial value</td> </tr> <tr> <td>Dissipation factor(tanδ)</td> <td>≅ 300% of the specified value</td> </tr> <tr> <td>Leakage current</td> <td>≅ specified value</td> </tr> </tbody> </table>		Capacitance change	≅ ±30% of the initial value	Dissipation factor(tanδ)	≅ 300% of the specified value	Leakage current	≅ specified value																																
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Dissipation factor(tanδ)	≅ 300% of the specified value																																						
Leakage current	≅ specified value																																						
Shelf Life	The following requirements shall be satisfied when the capacitor are restored to 25°C after exposing them for 1000 hours at 105°C without voltage applied.																																						
<table border="1"> <tbody> <tr> <td>Capacitance change</td> <td>≅ ±30% of the initial value</td> </tr> <tr> <td>Dissipation factor(tanδ)</td> <td>≅ 300% of the specified value</td> </tr> <tr> <td>Leakage current</td> <td>≅ 200% of the specified value</td> </tr> </tbody> </table>		Capacitance change	≅ ±30% of the initial value	Dissipation factor(tanδ)	≅ 300% of the specified value	Leakage current	≅ 200% of the specified value																																
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Dissipation factor(tanδ)	≅ 300% of the specified value																																						
Leakage current	≅ 200% of the specified value																																						
Others	Conforms to JIS-C-5101-4 (1998), characteristic W																																						

◆ DIMENSIONS (mm)



Code	Size	ΦD	L	α	A	B	C	W	P
6358	6.3×5.8	6.3	5.8	+0.4 -0.1	6.6	6.6	7.3	0.5~0.8	2.1
6377	6.3×7.7	6.3	7.7	±0.3	6.6	6.6	7.3	0.5~0.8	2.1
0862	8×6.2	8	6.2	+0.4 -0.1	8.3	8.3	8.8	0.5~0.8	2.2
08A5	8×10.5	8	10.5	0.5	8.3	8.3	9.1	0.8~1.2	3.1
10A5	10×10.5	10	10.5	0.5	10.3	10.3	11.0	0.8~1.2	4.6
10C5	10×12.5	10	12.5	0.5	10.3	10.3	11.0	0.8~1.2	4.6
12D5	12.5×13.5	12.5	13.5	1.0	12.8	12.8	13.8	0.8~1.2	4.6
12I6	12.5×16	12.5	16	1.0	12.8	12.8	13.8	0.8~1.2	4.6

◆ Marking



CTC Series

◆ Case size & Permissible rated ripple current

Nominal Capacitance (μF)	6.3V		10V		16V		25V		35V	
	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)
22							6.3×5.8	44	6.3×5.8	44
33					6.3×5.8	48	6.3×5.8	50	6.3×7.7	57
									8×6.2	57
47			6.3×5.8	50	6.3×5.8	50	6.3×7.7	63	8×10.5	92
							8×6.2	63		
100	6.3×5.8	69	6.3×7.7	81	6.3×7.7	81	8×10.5	116	10×10.5	151
			8×6.2	81	8×6.2	81				
150	6.3×7.7	85	8×10.5	125	8×10.5	125	10×10.5	320	10×10.5	290
	8×6.2	85								
220	6.3×7.7	120	8×10.5	141	10×10.5	216	8×10.5	180	10×10.5	375
	8×6.2	120					10×10.5	320		
330	8×10.5	290	10×10.5	290	10×10.5	290	10×10.5	320	10×12.5	375
									12.5×13.5	380
470	10×10.5	320	10×10.5	320	10×10.5	320	10×12.5	350	12.5×13.5	520
							12.5×13.5	400		
680	10×10.5	320	10×10.5	320	10×12.5	420	12.5×13.5	415	12.5×13.5	550
1000	10×10.5	410	10×12.5	390	12.5×13.5	550	12.5×13.5	460	12.5×16	600
1500	10×12.5	450	12.5×13.5	480	12.5×13.5	650	12.5×16	700		
2200	12.5×13.5	680	12.5×13.5	510						
			12.5×16	750						
3300	12.5×13.5	800								
	12.5×16	850								



CTC Series

◆ Case size & Permissible rated ripple current

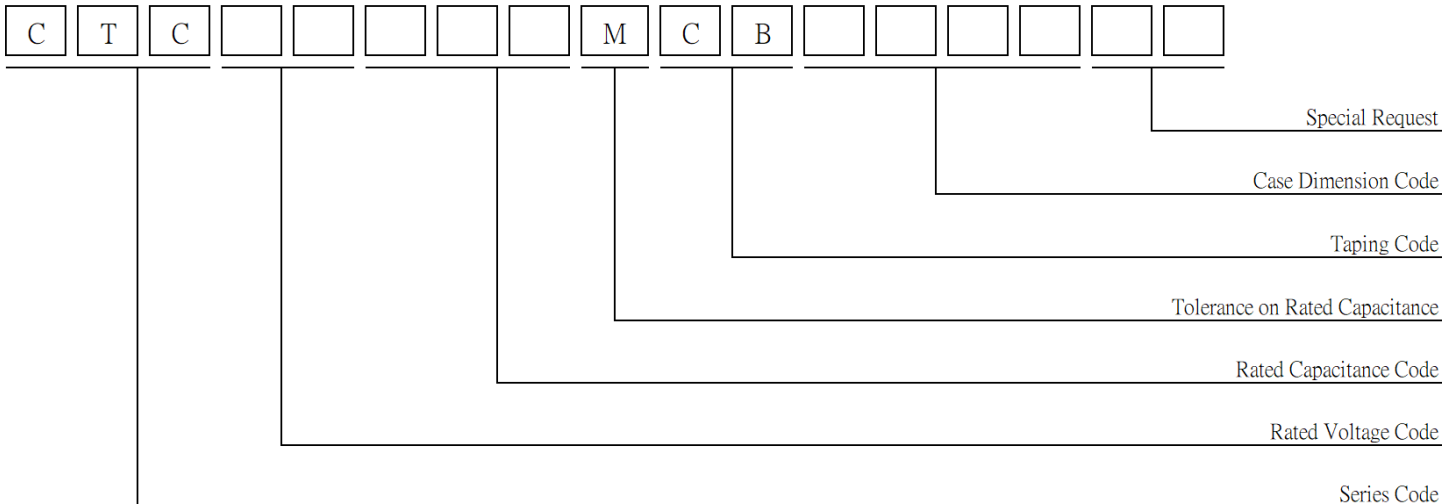
Nominal Capacitance (μF)	50V		63V		100V	
	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)
3.3					6.3×7.7	30
					8×6.2	30
4.7					8×10.5	50
10	6.3×5.8	32	6.3×7.7	45	8×10.5	55
			8×6.2	45		
22	6.3×7.7	58	8×10.5	65	10×10.5	70
	8×6.2	58				
33	8×10.5	140	10×10.5	80	10×10.5	80
47	10×10.5	310	10×10.5	90	10×12.5	150
					12.5×13.5	250
100	10×10.5	310	10×12.5	150	12.5×13.5	300
					12.5×13.5	380
150	10×10.5	310	10×12.5	150	12.5×16	420
220	10×12.5	320	12.5×13.5	470		
	12.5×13.5	340				
330	12.5×13.5	500	12.5×16	550		
	12.5×16	600				

◆ RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Size	Cap(μF)	Frequency (Hz)				
		50	120	300	1K	10K~
Ø6.3~Ø10		0.70	1.00	1.17	1.36	1.50
Ø12.5	~68	0.75	1.00	1.35	1.57	2.00
	100~470	0.80	1.00	1.23	1.34	1.50
	680~3300	0.85	1.00	1.10	1.13	1.15

◆ PART NUMBERING SYSTEM



ALUMINUM ELECTROLYTIC CAPACITORS



CTF Series

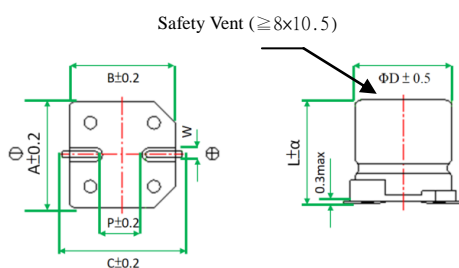
- High Voltage 160V~450V
- Long life 5,000 hours at 105°C



◆ SPECIFICATIONS

Item	Performance Characteristics									
Category Temperature Range	-40 ~ +105°C									
Working Voltage Range	160 ~ 450Vdc									
Capacitance Range	2.2 ~47 μF									
Capacitance Tolerance	±20% (at 25°C and 120Hz)									
Dissipation Factor (tanδ) (at 25°C, 120Hz)	<table border="1"> <tr> <td>Rated Voltage (V)</td> <td>160 ~ 250</td> <td>400</td> <td>450</td> </tr> <tr> <td>tanδ(Ma×)</td> <td>0.15</td> <td>0.20</td> <td>0.20</td> </tr> </table>	Rated Voltage (V)	160 ~ 250	400	450	tanδ(Ma×)	0.15	0.20	0.20	
	Rated Voltage (V)	160 ~ 250	400	450						
tanδ(Ma×)	0.15	0.20	0.20							
The above values should be increased by 0.02 for every additional 1000μF										
Leakage Current	(160V~450V) I=0.04CV+100μA whichever is greater impress the rated voltage for 2 minutes. I : Leakage current (μA) C : Rated capacitance (μF) V : Rated voltage (V)									
Low Temperature Characteristics Impedance Ratio(MA×)	<table border="1"> <tr> <td>Rated voltage (V)</td> <td>160~250</td> <td>400,450</td> </tr> <tr> <td>Z(-25°C)/Z(+20°C)</td> <td>3</td> <td>6</td> </tr> <tr> <td>Z(-40°C)/Z(+20°C)</td> <td>6</td> <td>10</td> </tr> </table>	Rated voltage (V)	160~250	400,450	Z(-25°C)/Z(+20°C)	3	6	Z(-40°C)/Z(+20°C)	6	10
	Rated voltage (V)	160~250	400,450							
	Z(-25°C)/Z(+20°C)	3	6							
Z(-40°C)/Z(+20°C)	6	10								
(at 120Hz)										
Endurance	The following specifications shall be satisfied when the capacitors are restored to 25°C after subjected to DC voltage with the rated voltage is applied for 5,000 hours (< Ø8 for 3,000 hours) at 105°C.									
	<table border="1"> <tr> <td>Capacitance change</td> <td>≒ ±20% of the initial value</td> </tr> <tr> <td>Dissipation factor(tanδ)</td> <td>≒ 200% of the specified value</td> </tr> <tr> <td>Leakage current</td> <td>≒ specified value</td> </tr> </table>	Capacitance change	≒ ±20% of the initial value	Dissipation factor(tanδ)	≒ 200% of the specified value	Leakage current	≒ specified value			
	Capacitance change	≒ ±20% of the initial value								
Dissipation factor(tanδ)	≒ 200% of the specified value									
Leakage current	≒ specified value									
Shelf Life	The following requirements shall be satisfied when the capacitor are restored to 25°C after exposing them for 1,000 hours at 105°C without voltage applied.									
	<table border="1"> <tr> <td>Capacitance change</td> <td>≒ ±20% of the initial value</td> </tr> <tr> <td>Dissipation factor(tanδ)</td> <td>≒ 200% of the specified value</td> </tr> <tr> <td>Leakage current</td> <td>≒ 200% of the specified value</td> </tr> </table>	Capacitance change	≒ ±20% of the initial value	Dissipation factor(tanδ)	≒ 200% of the specified value	Leakage current	≒ 200% of the specified value			
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Dissipation factor(tanδ)	≒ 200% of the specified value									
Leakage current	≒ 200% of the specified value									
Others	Conforms to JIS-C-5101-4 (1998), characteristic W.									

◆ DIMENSIONS (mm)



Code	Size	ΦD	L	α	A	B	C	W	P
63A5	6.3×10.5	6.3	10.5	0.3	6.6	6.6	7.1	0.5~0.8	2.2
08A5	8×10.5	8	10.5	0.5	8.3	8.3	9.1	0.8~1.2	3.1
08C5	8×12.5	8	12.5	0.5	8.3	8.3	9.1	0.8~1.2	3.1
10C5	10×12.5	10	12.5	0.5	10.3	10.3	11.0	0.8~1.2	4.6
12D5	12.5×13.5	12.5	13.5	1.0	12.8	12.8	13.8	0.8~1.2	4.6
1216	12.5×16	12.5	16	1.0	12.8	12.8	13.8	0.8~1.2	4.6

◆ Marking





CTF Series

◆ Case size & Permissible rated ripple current

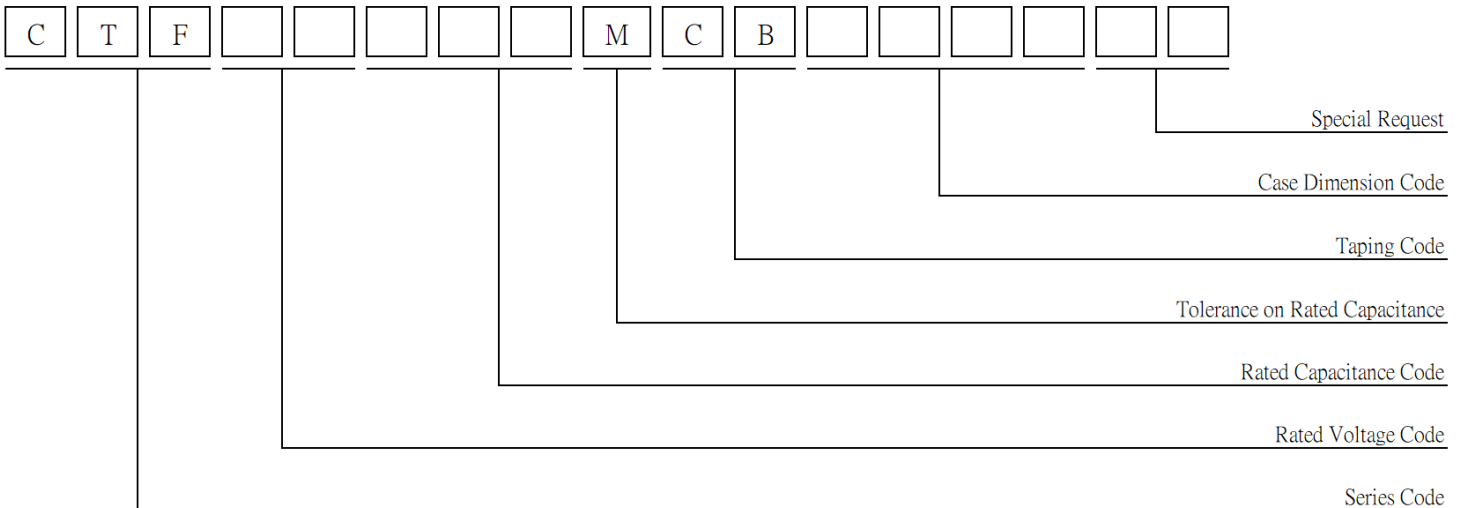
Nominal Capacitance (μF)	160V		200V		250V		400V		450V	
	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)
2.2	6.3×10.5	20	6.3×10.5	23	6.3×10.5	30	6.3×10.5	30	10×12.5	40
3.3	6.3×10.5	23	6.3×10.5	30	8×10.5	35	8×12.5	38	10×12.5	40
							10×12.5	40		
4.7	6.3×10.5	30	8×10.5	35	8×12.5	40	8×12.5	40	10×12.5	50
							10×12.5	50		
6.8	8×10.5	35	8×10.5	40	10×12.5	45	10×12.5	50	12.5×13.5	65
10	10×12.5	45	10×12.5	80	10×12.5	105	12.5×13.5	85	12.5×13.5	85
22	12.5×13.5	85	12.5×13.5	110	12.5×16	180				
33	12.5×13.5	95	12.5×16	220						
47	12.5×16	260								

◆ RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Vdc	Frequency (Hz)				
	50	120	300	1K	10K~
160 ~ 450	0.80	1.00	1.25	1.40	1.60

◆ PART NUMBERING SYSTEM



ALUMINUM ELECTROLYTIC CAPACITORS



CES Series

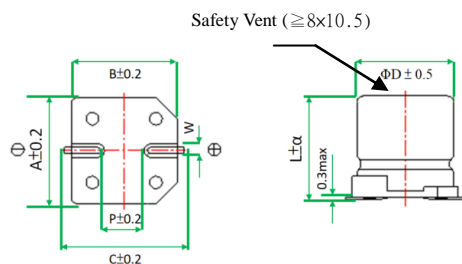
- Low impedance
- Load life 1,000 to 2,000 hours at 105°C



◆ SPECIFICATIONS

Item	Performance Characteristics																																	
Category Temperature Range	-55 ~ +105°C																																	
Working Voltage Range	6.3 ~ 50Vdc																																	
Capacitance Range	6.8 ~ 3,300 μF																																	
Capacitance Tolerance	±20% (at 25°C and 120Hz)																																	
Dissipation Factor (tanδ) (at 25°C, 120Hz)	<table border="1"> <thead> <tr> <th>Rated Voltage (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> </tr> </thead> <tbody> <tr> <td>tanδ(Max) Ø6.3~Ø10</td> <td>0.22</td> <td>0.20</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.12</td> </tr> <tr> <td>Ø12.5</td> <td>0.26</td> <td>0.22</td> <td>0.18</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> </tr> </tbody> </table>	Rated Voltage (V)	6.3	10	16	25	35	50	tanδ(Max) Ø6.3~Ø10	0.22	0.20	0.16	0.14	0.12	0.12	Ø12.5	0.26	0.22	0.18	0.16	0.14	0.12												
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The above values should be increased by 0.02 for every additional 1000μF																																		
Leakage Current	(Ø6.3~Ø10) I=0.01CV or 3μA whichever is greater impress the rated voltage for 2 minutes. (Ø12.5) I=0.03CV or 4μA whichever is greater impress the rated voltage for 1 minutes. I : Leakage current (μA) C : Rated capacitance (μF) V : Rated voltage (V)																																	
Low Temperature Characteristics Impedance Ratio(MAX)	<table border="1"> <thead> <tr> <th>Rated voltage (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Ø6.3~Ø10</td> <td>Z(-25°C)/Z(+20°C)</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z(-55°C)/Z(+20°C)</td> <td>5</td> <td>4</td> <td>4</td> <td>3</td> <td>3</td> </tr> <tr> <td rowspan="2">Ø12.5</td> <td>Z(-25°C)/Z(+20°C)</td> <td>3</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z(-55°C)/Z(+20°C)</td> <td>10</td> <td>8</td> <td>6</td> <td>4</td> <td>3</td> </tr> </tbody> </table>	Rated voltage (V)	6.3	10	16	25	35	50	Ø6.3~Ø10	Z(-25°C)/Z(+20°C)	2	2	2	2	2	Z(-55°C)/Z(+20°C)	5	4	4	3	3	Ø12.5	Z(-25°C)/Z(+20°C)	3	3	2	2	2	Z(-55°C)/Z(+20°C)	10	8	6	4	3
	Rated voltage (V)	6.3	10	16	25	35	50																											
Ø6.3~Ø10	Z(-25°C)/Z(+20°C)	2	2	2	2	2																												
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Ø12.5	Z(-25°C)/Z(+20°C)	3	3	2	2	2																												
	Z(-55°C)/Z(+20°C)	10	8	6	4	3																												
(at 120Hz)																																		
Endurance	The following specifications shall be satisfied when the capacitors are restored to 25°C after subjected to DC voltage with the rated voltage is applied for 2,000 hours (Ø6.3x5.8 for 1,000 hours) at 105°C																																	
	<table border="1"> <tbody> <tr> <td>Capacitance change</td> <td>≒ ±20% of the initial value</td> </tr> <tr> <td>Dissipation factor(tanδ)</td> <td>≒ 200% of the specified value</td> </tr> <tr> <td>Leakage current</td> <td>≒ specified value</td> </tr> </tbody> </table>	Capacitance change	≒ ±20% of the initial value	Dissipation factor(tanδ)	≒ 200% of the specified value	Leakage current	≒ specified value																											
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Shelf Life	The following requirements shall be satisfied when the capacitor are restored to 25°C after exposing them for 1000 hours at 105°C without voltage applied.																																	
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Others	Conforms to JIS-C-5101-4 (1998), characteristic W																																	

◆ DIMENSIONS (mm)



Code	Size	ΦD	L	α	A	B	C	W	P
6358	6.3×5.8	6.3	5.8	+0.4 -0.1	6.6	6.6	7.3	0.5~0.8	2.1
6377	6.3×7.7	6.3	7.7	±0.3	6.6	6.6	7.3	0.5~0.8	2.1
0862	8×6.2	8	6.2	+0.4 -0.1	8.3	8.3	8.8	0.5~0.8	2.2
08A5	8×10.5	8	10.5	0.5	8.3	8.3	9.1	0.8~1.2	3.1
10A5	10×10.5	10	10.5	0.5	10.3	10.3	11.0	0.8~1.2	4.6
10C5	10×12.5	10	12.5	0.5	10.3	10.3	11.0	0.8~1.2	4.6
12D5	12.5×13.5	12.5	13.5	1.0	12.8	12.8	13.8	0.8~1.2	4.6
12I6	12.5×16	12.5	16	1.0	12.8	12.8	13.8	0.8~1.2	4.6

◆ Marking



CES Series

◆ Case size & Permissible rated ripple current & Impedance

Nominal Capacitance (μF)	6.3V			10V			16V		
	Case size ΦD×L (mm)	Impedance @20°C 100kHz (Ωmax)	Max. Rated ripple current @105°C 100kHz (mA rms)	Case size ΦD×L (mm)	Impedance @20°C 100kHz (Ωmax)	Max. Rated ripple current @105°C 100kHz (mA rms)	Case size ΦD×L (mm)	Impedance @20°C 100kHz (Ωmax)	Max. Rated ripple current @105°C 100kHz (mA rms)
33							6.3×5.8	1.0	140
47				6.3×5.8	1.0	140	6.3×5.8	1.0	140
68	6.3×5.8	1.0	140	6.3×5.8	1.0	140	6.3×5.8	1.0	140
							6.3×7.7	0.6	230
100	6.3×5.8	1.0	140	6.3×5.8	1.0	140	6.3×5.8	1.0	140
				6.3×7.7	0.6	230	6.3×7.7	0.6	230
150	6.3×5.8	1.0	140	6.3×5.8	1.0	140	6.3×7.7	0.6	230
	6.3×7.7	0.6	230	6.3×7.7	0.6	230			
220	6.3×5.8	1.0	140	6.3×7.7	0.6	230	6.3×7.7	0.6	230
	6.3×7.7	0.6	230				8×6.2	0.6	230
							8×10.5	0.3	450
330	6.3×7.7	0.6	230	8×10.5	0.3	450	8×10.5	0.3	450
							10×10.5	0.15	670
							8×10.5	0.3	450
470	8×10.5	0.3	450	8×10.5	0.3	450	10×10.5	0.15	670
							10×10.5	0.15	670
680	8×10.5	0.3	450	10×10.5	0.15	670	10×10.5	0.15	670
1000	8×10.5	0.3	450	10×10.5	0.15	670	10×10.5	0.15	670
	10×10.5	0.15	670						
1500	10×10.5	0.15	670	10×12.5	0.13	750	12.5×13.5	0.11	820
	10×12.5	0.13	750	12.5×13.5	0.11	820			
2200	10×12.5	0.13	750	12.5×16	0.09	950	12.5×16	0.09	950
	12.5×13.5	0.11	820						
3300	12.5×13.5	0.11	820						
	12.5×16	0.09	950						

Nominal Capacitance (μF)	25V			35V			50V		
	Case size ΦD×L (mm)	Impedance @20°C 100kHz (Ωmax)	Max. Rated ripple current @105°C 100kHz (mA rms)	Case size ΦD×L (mm)	Impedance @20°C 100kHz (Ωmax)	Max. Rated ripple current @105°C 100kHz (mA rms)	Case size ΦD×L (mm)	Impedance @20°C 100kHz (Ωmax)	Max. Rated ripple current @105°C 100kHz (mA rms)
6.8							6.3×5.8	2.0	70
10							6.3×5.8	2.0	70
15	6.3×5.8	1.8	95				6.3×5.8	2.0	70
22	6.3×5.8	1.0	140	6.3×5.8	1.0	140	6.3×5.8	2.0	70
							6.3×7.7	1.0	120
33	6.3×5.8	1.0	140	6.3×5.8	1.0	140	6.3×7.7	1.0	120
47	6.3×5.8	1.0	140	6.3×5.8	1.0	140	6.3×7.7	1.0	120
	6.3×7.7	0.6	230	6.3×7.7	0.6	230			
68	6.3×7.7	0.6	230	6.3×7.7	0.6	230	8×10.5	0.6	300
100	6.3×7.7	0.6	230	6.3×7.7	0.6	260	8×10.5	0.6	300
				8×10.5	0.3	450			
150	6.3×7.7	0.6	230	8×10.5	0.3	450	10×10.5	0.3	500
	8×10.5	0.3	450						
220	8×10.5	0.3	450	8×10.5	0.3	450	10×10.5	0.3	500
				10×10.5	0.15	670			
330	8×10.5	0.3	450	10×10.5	0.15	670	10×12.5	0.25	580
	10×10.5	0.15	670				12.5×13.5	0.20	650
470	10×10.5	0.15	670	10×10.5	0.15	670	12.5×16	0.15	700
680	10×12.5	0.13	750	10×12.5	0.13	750			
				12.5×13.5	0.11	820			
1000	12.5×13.5	0.11	820	12.5×16	0.09	950			

ALUMINUM ELECTROLYTIC CAPACITORS



CES Series

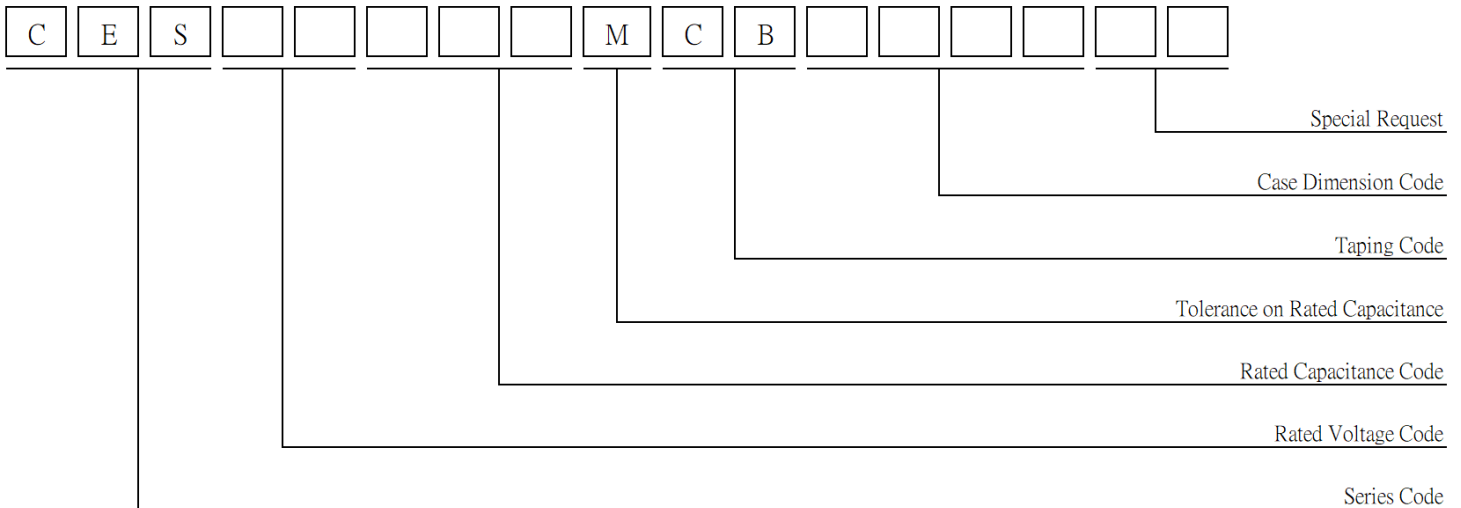
Nominal Capacitance (μF)	25V			35V			50V		
	Case size ΦD×L (mm)	Impedance @20°C 100kHz (Ωmax)	Max. Rated ripple current @105°C 100kHz (mA rms)	Case size ΦD×L (mm)	Impedance @20°C 100kHz (Ωmax)	Max. Rated ripple current @105°C 100kHz (mA rms)	Case size ΦD×L (mm)	Impedance @20°C 100kHz (Ωmax)	Max. Rated ripple current @105°C 100kHz (mA rms)
1500	12.5×16	0.09	950						

◆ RIPPLE CURRENT MULTIPLIER

Frequency Multiplier

Size	Cap(μF)	Frequency (Hz)				
		50	120	300	1K	10K~
Ø6.3~Ø10	1~68	0.35	0.50	0.64	0.83	1.00
	100~2,200	0.40	0.55	0.70	0.85	1.00
Ø12.5	~680	0.45	0.65	0.80	0.90	1.00
	1,000~3,300	0.65	0.85	0.95	1.00	1.00

◆ PART NUMBERING SYSTEM



ALUMINUM ELECTROLYTIC CAPACITORS



CED Series

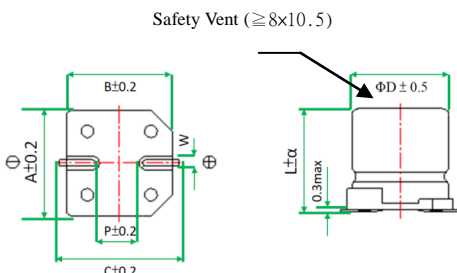
- Extra Low Impedance
- Load life 2,000 to 3,000 hours at 105°C



◆ SPECIFICATIONS

Item	Performance Characteristics																																					
Category Temperature Range	-55 ~ +105°C																																					
Working Voltage Range	6.3 ~ 50Vdc																																					
Capacitance Range	10 ~ 3,300 μF																																					
Capacitance Tolerance	±20% (at 25°C and 120Hz)																																					
Dissipation Factor (tanδ) (at 25°C, 120Hz)	<table border="1"> <thead> <tr> <th>Rated Voltage (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> </tr> </thead> <tbody> <tr> <td>tanδ(Max) Ø6.3~Ø10</td> <td>0.22</td> <td>0.20</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.12</td> </tr> <tr> <td>Ø12.5</td> <td>0.26</td> <td>0.22</td> <td>0.18</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> </tr> </tbody> </table>	Rated Voltage (V)	6.3	10	16	25	35	50	tanδ(Max) Ø6.3~Ø10	0.22	0.20	0.16	0.14	0.12	0.12	Ø12.5	0.26	0.22	0.18	0.16	0.14	0.12																
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The above values should be increased by 0.02 for every additional 1000μF																																						
Leakage Current	(Ø6.3~Ø10) I=0.01CV or 3μA whichever is greater impress the rated voltage for 2 minutes. (Ø12.5) I=0.03CV or 4μA whichever is greater impress the rated voltage for 1 minute. I : Leakage current (μA) C : Rated capacitance (μF) V : Rated voltage (V)																																					
Low Temperature Characteristics Impedance Ratio(MAX)	<table border="1"> <thead> <tr> <th>Rated voltage (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Ø6.3~Ø10</td> <td>Z(-25°C)/Z(+20°C)</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z(-55°C)/Z(+20°C)</td> <td>5</td> <td>4</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> </tr> <tr> <td rowspan="2">Ø12.5</td> <td>Z(-25°C)/Z(+20°C)</td> <td>3</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z(-55°C)/Z(+20°C)</td> <td>10</td> <td>8</td> <td>6</td> <td>4</td> <td>3</td> <td>3</td> </tr> </tbody> </table>	Rated voltage (V)	6.3	10	16	25	35	50	Ø6.3~Ø10	Z(-25°C)/Z(+20°C)	2	2	2	2	2	2	Z(-55°C)/Z(+20°C)	5	4	4	3	3	3	Ø12.5	Z(-25°C)/Z(+20°C)	3	3	2	2	2	2	Z(-55°C)/Z(+20°C)	10	8	6	4	3	3
	Rated voltage (V)	6.3	10	16	25	35	50																															
Ø6.3~Ø10	Z(-25°C)/Z(+20°C)	2	2	2	2	2	2																															
	Z(-55°C)/Z(+20°C)	5	4	4	3	3	3																															
Ø12.5	Z(-25°C)/Z(+20°C)	3	3	2	2	2	2																															
	Z(-55°C)/Z(+20°C)	10	8	6	4	3	3																															
(at 120Hz)																																						
Endurance	The following specifications shall be satisfied when the capacitors are restored to 25°C after subjected to DC voltage with the rated voltage is applied for 3,000 hours (Ø6.3x5.8 for 2,000 hours) at 105°C																																					
	<table border="1"> <tr> <td>Capacitance change</td> <td>≒ ±30% of the initial value</td> </tr> <tr> <td>Dissipation factor(tanδ)</td> <td>≒ 300% of the specified value</td> </tr> <tr> <td>Leakage current</td> <td>≒ specified value</td> </tr> </table>	Capacitance change	≒ ±30% of the initial value	Dissipation factor(tanδ)	≒ 300% of the specified value	Leakage current	≒ specified value																															
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Shelf Life	The following requirements shall be satisfied when the capacitor are restored to 25°C after exposing them for 1,000 hours at 105°C without voltage applied.																																					
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Others	Conforms to JIS-C-5101-4 (1998), characteristic W																																					

◆ DIMENSIONS (mm)



Code	Size	ΦD	L	α	A	B	C	W	P
6358	6.3×5.8	6.3	5.8	+0.4 -0.1	6.6	6.6	7.3	0.5~0.8	2.1
6377	6.3×7.7	6.3	7.7	±0.3	6.6	6.6	7.3	0.5~0.8	2.1
0862	8×6.2	8	6.2	+0.4 -0.1	8.3	8.3	8.8	0.5~0.8	2.2
08A5	8×10.5	8	10.5	0.5	8.3	8.3	9.1	0.8~1.2	3.1
10A5	10×10.5	10	10.5	0.5	10.3	10.3	11.0	0.8~1.2	4.6
10C5	10×12.5	10	12.5	0.5	10.3	10.3	11.0	0.8~1.2	4.6
12D5	12.5×13.5	12.5	13.5	1.0	12.8	12.8	13.8	0.8~1.2	4.6
12I6	12.5×16	12.5	16	1.0	12.8	12.8	13.8	0.8~1.2	4.6

◆ Marking

≒ 6.3 Φ



≒ 8 Φ



CED Series

◆ Case size & Permissible rated ripple current & Impedance

Nominal Capacitance (μF)	6.3V			10V			16V					
	Case size ΦD×L (mm)	Impedance @20°C 100KHz (Ωmax)	Max. Rated ripple current @105°C 100KHz (mA rms)	Case size ΦD×L (mm)	Impedance @20°C 100KHz (Ωmax)	Max. Rated ripple current @105°C 100KHz (mA rms)	Case size ΦD×L (mm)	Impedance @20°C 100KHz (Ωmax)	Max. Rated ripple current @105°C 100KHz (mA rms)			
33							6.3x5.8	0.44	230			
47				6.3x5.8	0.44	230	6.3x5.8	0.44	230			
56				6.3x5.8	0.44	230	6.3x5.8	0.44	230			
68	6.3x5.8	0.44	230	6.3x5.8	0.44	230	6.3x5.8	0.44	230			
							6.3x7.7	0.34	280			
							8x6.2	0.34	280			
100	6.3x5.8	0.44	230	6.3x5.8	0.44	230	6.3x5.8	0.44	230			
				6.3x7.7	0.34	280	6.3x7.7	0.34	280			
				8x6.2	0.34	280	8x6.2	0.34	280			
150	6.3x5.8	0.44	230	6.3x7.7	0.34	280	6.3x7.7	0.34	280			
220	6.3x5.8	0.44	230	6.3x7.7	0.34	280	6.3x7.7	0.34	280			
	6.3x7.7	0.34	280				8x6.2	0.34	280	8x10.5	0.17	450
	8x6.2	0.34	280									
330	6.3x7.7	0.34	280	8x10.5	0.17	450	8x10.5	0.17	450			
	8x6.2	0.34	280				10x10.5	0.09	670			
470	8x10.5	0.17	450	8x10.5	0.17	450	8x10.5	0.17	450			
							10x10.5	0.09	670			
680	8x10.5	0.17	450	10x10.5	0.09	670	10x10.5	0.09	670			
	10x10.5	0.09	670				10x12.5	0.075	800			
1000	8x10.5	0.17	450	10x10.5	0.09	670	12.5x13.5	0.065	900			
	10x10.5	0.09	670				12.5x16	0.060	1050			
1500	10x10.5	0.09	670	12.5x13.5	0.065	900						
	10x12.5	0.075	800									
2200	12.5x13.5	0.065	900	12.5x16	0.060	1050						
3300	12.5x16	0.060	1050									

Nominal Capacitance (μF)	25V			35V			50V		
	Case size ΦD×L (mm)	Impedance @20°C 100KHz (Ωmax)	Max. Rated ripple current @105°C 100KHz (mA rms)	Case size ΦD×L (mm)	Impedance @20°C 100KHz (Ωmax)	Max. Rated ripple current @105°C 100KHz (mA rms)	Case size ΦD×L (mm)	Impedance @20°C 100KHz (Ωmax)	Max. Rated ripple current @105°C 100KHz (mA rms)
10							6.3x5.8	0.88	165
15							6.3x5.8	0.88	165
22	6.3x5.8	0.44	230	6.3x5.8	0.44	230	6.3x5.8	0.88	165
							6.3x7.7	0.68	185
							8x6.2	0.68	185
33	6.3x5.8	0.44	230	6.3x5.8	0.44	230	6.3x7.7	0.68	185
				8x6.2	0.34	280	8x6.2	0.68	185
47	6.3x5.8	0.44	230	6.3x5.8	0.44	230	6.3x7.7	0.68	185
	6.3x7.7	0.34	280	6.3x7.7	0.34	280			
	8x6.2	0.34	280	8x6.2	0.34	280			
56	6.3x5.8	0.44	230	6.3x7.7	0.34	280	6.3x7.7	0.68	185
	6.3x7.7	0.34	280				8x10.5	0.34	350
68	6.3x7.7	0.34	280	6.3x7.7	0.34	280	8x10.5	0.34	350
100	6.3x7.7	0.34	280	8x10.5	0.17	450	8x10.5	0.34	350
	8x6.2	0.34	280				10x10.5	0.18	670
150	6.3x7.7	0.34	280	10x10.5	0.09	670	10x10.5	0.18	670
	8x10.5	0.17	450						

ALUMINUM ELECTROLYTIC CAPACITORS



CED Series

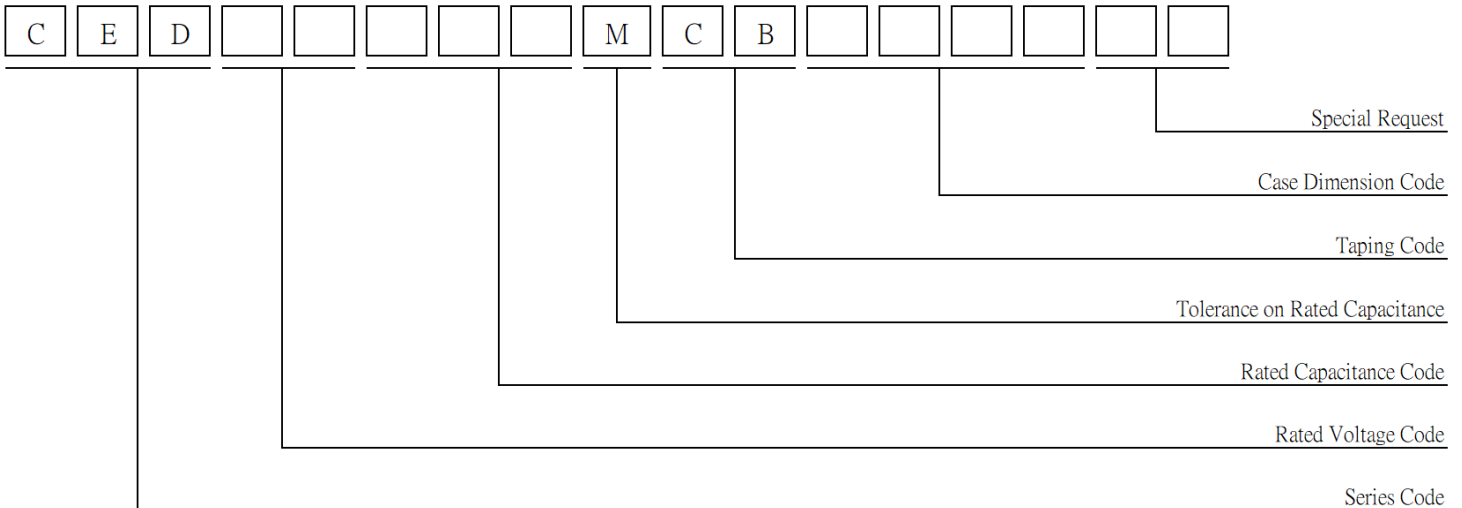
Nominal Capacitance (μF)	25V			35V			50V		
	Case size ΦD×L (mm)	Impedance @20°C 100KHz (Ωmax)	Max. Rated ripple current @105°C 100KHz (mA rms)	Case size ΦD×L (mm)	Impedance @20°C 100KHz (Ωmax)	Max. Rated ripple current @105°C 100KHz (mA rms)	Case size ΦD×L (mm)	Impedance @20°C 100KHz (Ωmax)	Max. Rated ripple current @105°C 100KHz (mA rms)
220	8×10.5	0.17	450	10×10.5	0.09	670	10×10.5	0.18	670
							10×12.5	0.16	750
330	8×10.5	0.17	450	10×10.5	0.09	670	12.5×13.5	0.14	800
	10×10.5	0.09	670						
470	10×10.5	0.09	670	10×12.5	0.075	800	12.5×16	0.12	900
	10×12.5	0.075	800	12.5×13.5	0.065	900			
680	12.5×13.5	0.065	900	12.5×13.5	0.065	900			
				12.5×16	0.060	1050			
1000	12.5×16	0.060	1050						

◆ RIPPLE CURRENT MULTIPLIER

Frequency Multipliers

Size	Cap(μF)	Frequency (Hz)				
		50	120	300	1K	10K~
Ø6.3-Ø10	10~68	0.35	0.50	0.64	0.83	1.00
	100~1,500	0.40	0.55	0.70	0.85	1.00
Ø12.5	~680	0.45	0.65	0.80	0.90	1.00
	1000~3,300	0.65	0.85	0.95	1.00	1.00

◆ PART NUMBERING SYSTEM



ALUMINUM ELECTROLYTIC CAPACITORS



CEE Series

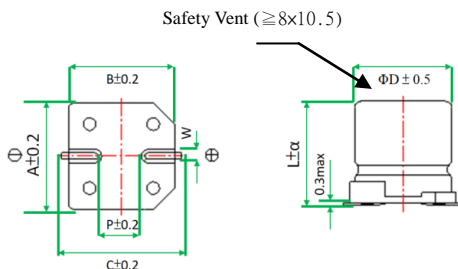
- Extra Low impedance
- Load life 2,000~5,000 hours at 105°C



◆ SPECIFICATIONS

Item	Performance Characteristics															
Category Temperature Range	-55 ~ +105°C															
Working Voltage Range	50 ~ 100Vdc															
Capacitance Range	4.7 ~ 470 μF															
Capacitance Tolerance	±20% (at 25°C and 120Hz)															
Dissipation Factor (tanδ) (at 25°C, 120Hz)	<table border="1"> <thead> <tr> <th>Rated Voltage (V)</th> <th>50</th> <th>63</th> <th>80</th> <th>100</th> </tr> </thead> <tbody> <tr> <td>tanδ(Max) Ø6.3~Ø10</td> <td>0.10</td> <td>0.08</td> <td>0.08</td> <td>0.07</td> </tr> <tr> <td>Ø12.5</td> <td>0.10</td> <td>0.08</td> <td>0.08</td> <td>0.07</td> </tr> </tbody> </table>	Rated Voltage (V)	50	63	80	100	tanδ(Max) Ø6.3~Ø10	0.10	0.08	0.08	0.07	Ø12.5	0.10	0.08	0.08	0.07
	Rated Voltage (V)	50	63	80	100											
tanδ(Max) Ø6.3~Ø10	0.10	0.08	0.08	0.07												
Ø12.5	0.10	0.08	0.08	0.07												
Leakage Current	(Ø6.3~Ø10) I=0.01CV or 3μA whichever is greater impress the rated voltage for 2 minutes. (Ø12.5) I=0.03CV or 4μA whichever is greater impress the rated voltage for 1 minutes. I : Leakage current (μA) C : Rated capacitance (μF) V : Rated voltage (V)															
Low Temperature Characteristics Impedance Ratio(MAX)	<table border="1"> <thead> <tr> <th>Rated voltage (V)</th> <th>50</th> <th>63</th> <th>80</th> <th>100</th> </tr> </thead> <tbody> <tr> <td>Z(-25°C)/Z(+20°C)</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z(-55°C)/Z(+20°C)</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> </tbody> </table>	Rated voltage (V)	50	63	80	100	Z(-25°C)/Z(+20°C)	2	2	2	2	Z(-55°C)/Z(+20°C)	3	3	3	3
	Rated voltage (V)	50	63	80	100											
	Z(-25°C)/Z(+20°C)	2	2	2	2											
Z(-55°C)/Z(+20°C)	3	3	3	3												
	(at 120Hz)															
Endurance	The following specifications shall be satisfied when the capacitors are restored to 25°C after subjected to DC voltage with the rated voltage is applied for 5,000 hours (Ø6.3x5.8, Ø6.3x7.7, Ø8x6.2 for 2,000 hours) at 105°C															
	<table border="1"> <tbody> <tr> <td>Capacitance change</td> <td>≧ ±30% of the initial value</td> </tr> <tr> <td>Dissipation factor(tanδ)</td> <td>≧ 300% of the specified value</td> </tr> <tr> <td>Leakage current</td> <td>≧ specified value</td> </tr> </tbody> </table>	Capacitance change	≧ ±30% of the initial value	Dissipation factor(tanδ)	≧ 300% of the specified value	Leakage current	≧ specified value									
	Capacitance change	≧ ±30% of the initial value														
Dissipation factor(tanδ)	≧ 300% of the specified value															
Leakage current	≧ specified value															
Shelf Life	The following requirements shall be satisfied when the capacitor are restored to 25°C after exposing them for 1,000 hours at 105°C without voltage applied.															
	<table border="1"> <tbody> <tr> <td>Capacitance change</td> <td>≧ ±30% of the initial value</td> </tr> <tr> <td>Dissipation factor(tanδ)</td> <td>≧ 300% of the specified value</td> </tr> <tr> <td>Leakage current</td> <td>≧ 200% of the specified value</td> </tr> </tbody> </table>	Capacitance change	≧ ±30% of the initial value	Dissipation factor(tanδ)	≧ 300% of the specified value	Leakage current	≧ 200% of the specified value									
	Capacitance change	≧ ±30% of the initial value														
Dissipation factor(tanδ)	≧ 300% of the specified value															
Leakage current	≧ 200% of the specified value															
Others	Conforms to JIS-C-5101-4 (1998), characteristic W															

◆ DIMENSIONS (mm)



Code	Size	ΦD	L	α	A	B	C	W	P
6358	6.3×5.8	6.3	5.8	+0.4 -0.1	6.6	6.6	7.3	0.5~0.8	2.1
6377	6.3×7.7	6.3	7.7	±0.3	6.6	6.6	7.3	0.5~0.8	2.1
0862	8×6.2	8	6.2	+0.4 -0.1	8.3	8.3	8.8	0.5~0.8	2.2
08A5	8×10.5	8	10.5	0.5	8.3	8.3	9.1	0.8~1.2	3.1
10A5	10×10.5	10	10.5	0.5	10.3	10.3	11.0	0.8~1.2	4.6
10C5	10×12.5	10	12.5	0.5	10.3	10.3	11.0	0.8~1.2	4.6
12D5	12.5×13.5	12.5	13.5	1.0	12.8	12.8	13.8	0.8~1.2	4.6
12I6	12.5×16	12.5	16	1.0	12.8	12.8	13.8	0.8~1.2	4.6

◆ Marking





CEE Series

◆ Case size & Permissible rated ripple current & Impedance

Nominal Capacitance (μF)	50V			63V			80V		
	Case size ΦD×L (mm)	Impedance @20°C 100KHz (Ωmax)	Max. Rated ripple current @105°C 100KHz (mA rms)	Case size ΦD×L (mm)	Impedance @20°C 100KHz (Ωmax)	Max. Rated ripple current @105°C 100KHz (mA rms)	Case size ΦD×L (mm)	Impedance @20°C 100KHz (Ωmax)	Max. Rated ripple current @105°C 100KHz (mA rms)
4.7							6.3×5.8	3.0	40
10	6.3×5.8	0.88	165	6.3×5.8	1.5	80	6.3×7.7	2.4	60
	8×10.5	0.88	165				6.3×7.7	1.2	120
	15	6.3×5.8	0.88	165					
22	6.3×5.8	0.88	165	6.3×7.7	1.2	120	8×10.5	1.3	130
	6.3×7.7	0.68	195	8×6.2	1.2	120			
	8×6.2	0.68	195	8×10.5	0.65	250			
	8×10.5	0.68	195						
33	6.3×7.7	0.68	195	8×10.5	0.65	250	8×10.5	1.3	130
	8×6.2	0.68	195						
47	6.3×7.7	0.68	195	8×10.5	0.65	250	10×10.5	0.7	200
	8×6.2	0.68	195						
56	8×10.5	0.34	350						
68	8×10.5	0.34	350	8×10.5	0.65	250	12.5×13.5	0.32	500
				12.5×13.5	0.16	800			
100	8×10.5	0.34	350	10×10.5	0.35	400	12.5×13.5	0.32	500
	10×10.5	0.18	670	12.5×13.5	0.16	800			
150	10×10.5	0.18	670	10×10.5	0.25	650	12.5×13.5	0.32	500
				12.5×13.5	0.16	800			
220	10×10.5	0.18	670	12.5×13.5	0.16	800	12.5×16	0.26	550
	10×12.5	0.14	780						
330	12.5×13.5	0.12	900						
470	12.5×16	0.10	1050						

Nominal Capacitance (μF)	100V		
	Case size ΦD×L (mm)	Impedance @20°C 100KHz (Ωmax)	Max. Rated ripple current @105°C 100KHz (mA rms)
10	8×10.5	1.3	130
22	8×10.5	1.3	130
	10×10.5	0.7	200
33	10×10.5	0.7	200
47	10×12.5	0.60	250
	12.5×13.5	0.32	500
68	12.5×13.5	0.32	500
100	12.5×13.5	0.32	500
	12.5×16	0.26	550

ALUMINUM ELECTROLYTIC CAPACITORS



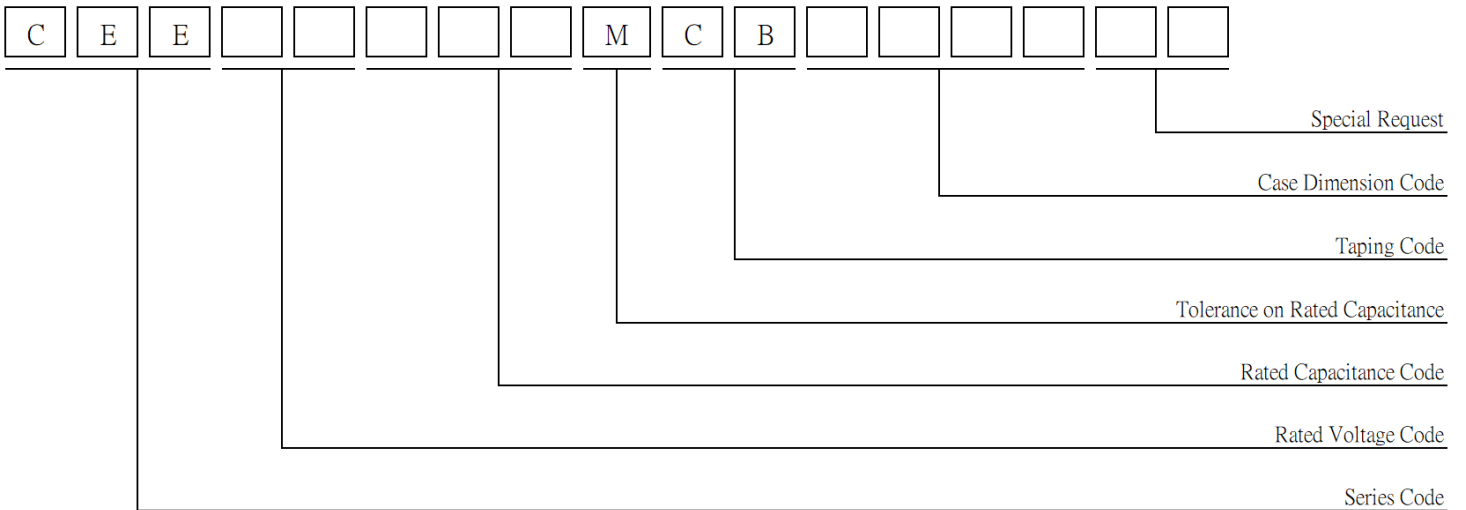
CEE Series

◆ RIPPLE CURRENT MULTIPLIER

Frequency Multipliers

Size	Cap(μF)	Frequency (Hz)				
		50	120	300	1K	10K~
Ø6.3~Ø10	4.7~68	0.35	0.50	0.64	0.83	1.00
	100~470	0.40	0.55	0.70	0.85	1.00
Ø12.5	~68	0.40	0.55	0.70	0.85	1.00
	100~470	0.45	0.65	0.80	0.90	1.00

◆ PART NUMBERING SYSTEM



ALUMINUM ELECTROLYTIC CAPACITORS



CHJ Series

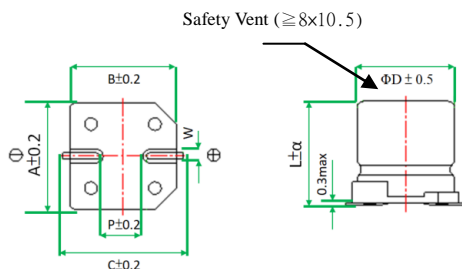
- High temperature at 125°C
- Load life 1,000 to 5,000 hours



◆ SPECIFICATIONS

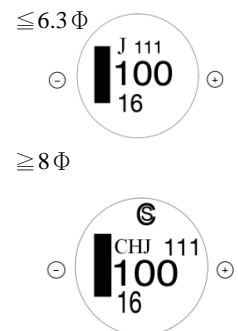
Item	Performance Characteristics																																					
Category Temperature Range	-40 ~ +125°C																																					
Working Voltage Range	10 ~ 450Vdc																																					
Capacitance Range	3.3 ~ 1,000 μF																																					
Capacitance Tolerance	±20% (at 25°C and 120Hz)																																					
Dissipation Factor (tanδ) (at 25°C, 120Hz)	<table border="1"> <thead> <tr> <th>Rated Voltage (V)</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>100</th> <th>160~250</th> <th>400~450</th> </tr> </thead> <tbody> <tr> <td rowspan="2">tanδ(Max)</td> <td>∅6.3~∅10</td> <td>0.24</td> <td>0.20</td> <td>0.16</td> <td>0.14</td> <td>0.14</td> <td>0.18</td> <td>0.18</td> <td>-</td> <td>-</td> </tr> <tr> <td>∅12.5</td> <td>0.22</td> <td>0.18</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.14</td> <td>0.10</td> <td>0.20</td> <td>0.20</td> </tr> </tbody> </table>	Rated Voltage (V)	10	16	25	35	50	63	100	160~250	400~450	tanδ(Max)	∅6.3~∅10	0.24	0.20	0.16	0.14	0.14	0.18	0.18	-	-	∅12.5	0.22	0.18	0.16	0.14	0.12	0.14	0.10	0.20	0.20						
	Rated Voltage (V)	10	16	25	35	50	63	100	160~250	400~450																												
tanδ(Max)	∅6.3~∅10	0.24	0.20	0.16	0.14	0.14	0.18	0.18	-	-																												
	∅12.5	0.22	0.18	0.16	0.14	0.12	0.14	0.10	0.20	0.20																												
The above values should be increased by 0.02 for every additional 1000μF																																						
Leakage Current	(10V~100V) I=0.03CV or 4μA whichever is greater impress the rated voltage for 2 minutes. (160V~450V) I=0.04CV+100μA whichever is greater impress the rated voltage for 2 minutes. I : Leakage current (μA) C : Rated capacitance (μF) V : Rated voltage (V)																																					
Low Temperature Characteristics Impedance Ratio(MAX)	<table border="1"> <thead> <tr> <th>Rated voltage (V)</th> <th>10</th> <th>16</th> <th>25</th> <th>35~100</th> <th>160~250</th> <th>400~450</th> </tr> </thead> <tbody> <tr> <td rowspan="2">∅6.3~∅10</td> <td>Z(-25°C)/Z(+20°C)</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>-</td> <td>-</td> </tr> <tr> <td>Z(-40°C)/Z(+20°C)</td> <td>10</td> <td>8</td> <td>6</td> <td>4</td> <td>-</td> <td>-</td> </tr> <tr> <td rowspan="2">∅12.5</td> <td>Z(-25°C)/Z(+20°C)</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>3</td> <td>6</td> </tr> <tr> <td>Z(-40°C)/Z(+20°C)</td> <td>8</td> <td>6</td> <td>4</td> <td>3</td> <td>6</td> <td>10</td> </tr> </tbody> </table>	Rated voltage (V)	10	16	25	35~100	160~250	400~450	∅6.3~∅10	Z(-25°C)/Z(+20°C)	4	3	2	2	-	-	Z(-40°C)/Z(+20°C)	10	8	6	4	-	-	∅12.5	Z(-25°C)/Z(+20°C)	4	3	2	2	3	6	Z(-40°C)/Z(+20°C)	8	6	4	3	6	10
	Rated voltage (V)	10	16	25	35~100	160~250	400~450																															
∅6.3~∅10	Z(-25°C)/Z(+20°C)	4	3	2	2	-	-																															
	Z(-40°C)/Z(+20°C)	10	8	6	4	-	-																															
∅12.5	Z(-25°C)/Z(+20°C)	4	3	2	2	3	6																															
	Z(-40°C)/Z(+20°C)	8	6	4	3	6	10																															
(at 120Hz)																																						
Endurance	The following specifications shall be satisfied when the capacitors are restored to 25°C after subjected to DC voltage with the rated voltage is applied for 5,000 hours (∅8x10.5~∅10 for 2,000 hours), (∅6.3 for 1,000 hours) at 125°C. Rated voltage is applied for 2,000hours (160~450V, ∅12.5) at 125°C.																																					
	<table border="1"> <tbody> <tr> <td>Capacitance change</td> <td>≒ ±30% of the initial value</td> </tr> <tr> <td>Dissipation factor(tanδ)</td> <td>≒ 300% of the specified value</td> </tr> <tr> <td>Leakage current</td> <td>≒ specified value</td> </tr> </tbody> </table>	Capacitance change	≒ ±30% of the initial value	Dissipation factor(tanδ)	≒ 300% of the specified value	Leakage current	≒ specified value																															
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Dissipation factor(tanδ)	≒ 300% of the specified value																																					
Leakage current	≒ specified value																																					
Shelf Life	The following requirements shall be satisfied when the capacitor are restored to 25°C after exposing them for 1,000 hours at 125°C without voltage applied.																																					
	<table border="1"> <tbody> <tr> <td>Capacitance change</td> <td>≒ ±30% of the initial value</td> </tr> <tr> <td>Dissipation factor(tanδ)</td> <td>≒ 300% of the specified value</td> </tr> <tr> <td>Leakage current</td> <td>≒ 200% of the specified value</td> </tr> </tbody> </table>	Capacitance change	≒ ±30% of the initial value	Dissipation factor(tanδ)	≒ 300% of the specified value	Leakage current	≒ 200% of the specified value																															
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Others	Conforms to JIS-C-5101-4 (1998), characteristic W																																					

◆ DIMENSIONS (mm)



Code	Size	ΦD	L	α	A	B	C	W	P
6358	6.3x5.8	6.3	5.8	+0.4 -0.1	6.6	6.6	7.3	0.5~0.8	2.1
6377	6.3x7.7	6.3	7.7	0.3	6.6	6.6	7.3	0.5~0.8	2.1
08A5	8x10.5	8	10.5	0.5	8.3	8.3	9.1	0.8~1.2	3.1
10A5	10x10.5	10	10.5	0.5	10.3	10.3	11.0	0.8~1.2	4.6
10C5	10x12.5	10	12.5	0.5	10.3	10.3	11.0	0.8~1.2	4.6
12D5	12.5x13.5	12.5	13.5	1.0	12.8	12.8	13.8	0.8~1.2	4.6
12I6	12.5x16	12.5	16	1.0	12.8	12.8	13.8	0.8~1.2	4.6

◆ Marking



CHJ Series

◆ Case size & Permissible rated ripple current & ESR

Nominal Capacitance (μF)	10V			16V			25V		
	Case size ΦD×L (mm)	ESR @20°C 100KHz (Ωmax)	Max. Rated ripple current @125°C 100KHz (mA rms)	Case size ΦD×L (mm)	ESR @20°C 100KHz (Ωmax)	Max. Rated ripple current @125°C 100KHz (mA rms)	Case size ΦD×L (mm)	ESR @20°C 100KHz (Ωmax)	Max. Rated ripple current @125°C 100KHz (mA rms)
33							6.3×5.8	3.3	45
47				6.3×5.8	3.3	43	6.3×7.7	2.3	68
100	6.3×7.7	2.3	72	8×10.5	1.0	115	8×10.5	1.0	126
220	8×10.5	1.0	136	10×10.5	0.7	175	10×10.5	0.7	211
330	10×10.5	0.7	188	10×12.5	0.5	280	10×12.5	0.5	270
							12.5×13.5	0.14	750
470	10×12.5	0.5	300	12.5×13.5	0.14	750	12.5×13.5	0.14	750
680				12.5×13.5	0.14	750			
1000	12.5×13.5	0.14	750						
	12.5×16	0.11	1000						

Nominal Capacitance (μF)	35V			50V			63V		
	Case size ΦD×L (mm)	ESR @20°C 100KHz (Ωmax)	Max. Rated ripple current @125°C 100KHz (mA rms)	Case size ΦD×L (mm)	ESR @20°C 100KHz (Ωmax)	Max. Rated ripple current @125°C 100KHz (mA rms)	Case size ΦD×L (mm)	ESR @20°C 100KHz (Ωmax)	Max. Rated ripple current @125°C 100KHz (mA rms)
10	6.3×5.8	3.3	38	6.3×5.8	3.3	38	6.3×7.7	2.3	42
				6.3×7.7	2.3	50			
22	6.3×5.8	3.3	39	6.3×7.7	2.3	50	8×10.5	1.0	56
33	6.3×7.7	2.3	62	8×10.5	1.0	83	10×10.5	0.7	77
47	8×10.5	1.0	92	10×10.5	0.7	111	10×12.5	0.45	150
100	10×10.5	0.7	151	12.5×13.5	0.23	550	12.5×13.5	0.25	500
220	10×12.5	0.5	260	12.5×13.5	0.23	550	12.5×16	0.20	600
	12.5×13.5	0.14	750						
330	12.5×13.5	0.14	750	12.5×16	0.18	700			
470	12.5×16	0.11	900						

Nominal Capacitance (μF)	100V		
	Case size ΦD×L (mm)	ESR @20°C 100KHz (Ωmax)	Max. Rated ripple current @125°C 100KHz (mA rms)
10	8×10.5	1.00	53
22	10×10.5	0.70	63
33	10×12.5	0.45	130
47	12.5×13.5	0.33	450
68	12.5×16	0.26	550

ALUMINUM ELECTROLYTIC CAPACITORS



CHJ Series

◆ Case size & Permissible rated ripple current

Nominal Capacitance (μF)	160V		200V		250V		400V		450V	
	Case size ΦD×L (mm)	Max. Rated ripple current @125°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @125°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @125°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @125°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @125°C 120Hz (mA rms)
3.3									12.5×16	65
4.7							12.5×13.5	70		
10	12.5×13.5	100	12.5×13.5	100	12.5×16	110				

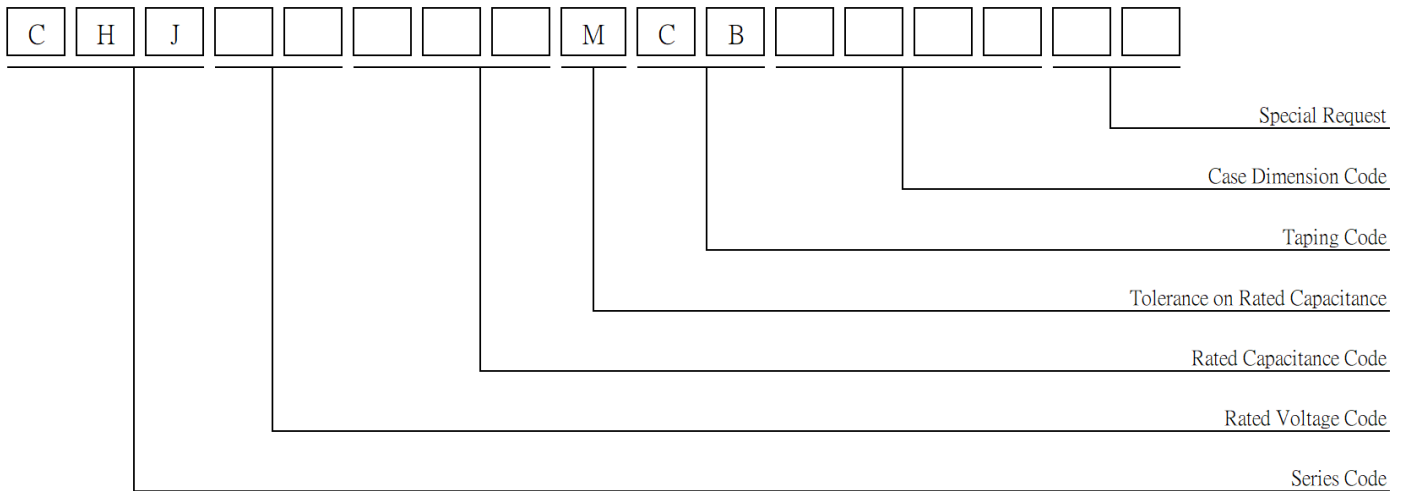
◆ RIPPLE CURRENT MULTIPLIER

Frequency Multipliers

Vdc	Cap(μF)	Frequency (Hz)				
		50	120	1K	10K	10K~
10~100	10~100	0.35	0.40	0.75	0.90	1.00
	220~470	0.35	0.50	0.85	0.94	1.00
	680~1000	0.40	0.60	0.85	0.95	1.00

Vdc	Frequency (Hz)					
	50	120	300	1K	10K	10K~
160~450	0.75	1.00	1.25	1.50	1.75	1.80

◆ PART NUMBERING SYSTEM



ALUMINUM ELECTROLYTIC CAPACITORS



CSN Series

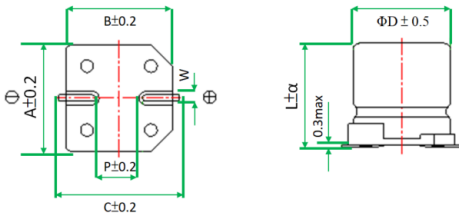
- Bi-polarized with temperature range -40 ~ 105°C
- Load life 1,000 hours at 105°C



◆ SPECIFICATIONS

Item	Performance Characteristics																					
Category Temperature Range	-40 ~ +105°C																					
Working Voltage Range	6.3 ~ 50 Vdc																					
Capacitance Range	0.1 ~ 100 μF																					
Capacitance Tolerance	±20% (at 25°C and 120Hz)																					
Dissipation Factor (tanδ) (at 25°C, 120Hz)	<table border="1"> <thead> <tr> <th>Rated Voltage (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> </tr> </thead> <tbody> <tr> <td>tanδ(Max)</td> <td>0.24</td> <td>0.20</td> <td>0.17</td> <td>0.17</td> <td>0.15</td> <td>0.15</td> </tr> </tbody> </table>	Rated Voltage (V)	6.3	10	16	25	35	50	tanδ(Max)	0.24	0.20	0.17	0.17	0.15	0.15							
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tanδ(Max)	0.24	0.20	0.17	0.17	0.15	0.15																
Leakage Current	I=0.05CV or 10μA whichever is greater impress the rated voltage for 2 minutes. I : Leakage current (μA) C : Rated capacitance (μF) V : Rated voltage (V)																					
Low Temperature Characteristics Impedance Ratio(MAX)	<table border="1"> <thead> <tr> <th>Rated voltage (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> </tr> </thead> <tbody> <tr> <td>Z(-25°C)/Z(+20°C)</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z(-40°C)/Z(+20°C)</td> <td>8</td> <td>6</td> <td>4</td> <td>4</td> <td>3</td> <td>3</td> </tr> </tbody> </table> <p style="text-align: right;">(at 120Hz)</p>	Rated voltage (V)	6.3	10	16	25	35	50	Z(-25°C)/Z(+20°C)	4	3	2	2	2	2	Z(-40°C)/Z(+20°C)	8	6	4	4	3	3
Rated voltage (V)	6.3	10	16	25	35	50																
Z(-25°C)/Z(+20°C)	4	3	2	2	2	2																
Z(-40°C)/Z(+20°C)	8	6	4	4	3	3																
Endurance	The following specifications shall be satisfied when the capacitors are restored to 25°C after subjected to DC voltage with the rated voltage is applied for 1,000 hours at 105°C (The polarity needs to exchange every 250 hours.) <table border="1"> <tbody> <tr> <td>Capacitance change</td> <td>≒ ±20% of the initial value</td> </tr> <tr> <td>Dissipation factor(tanδ)</td> <td>≒ 200% of the specified value</td> </tr> <tr> <td>Leakage current</td> <td>≒ specified value</td> </tr> </tbody> </table>	Capacitance change	≒ ±20% of the initial value	Dissipation factor(tanδ)	≒ 200% of the specified value	Leakage current	≒ specified value															
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Others	Conforms to JIS-C-5101-4 (1998), characteristic W.																					

◆ DIMENSIONS (mm)



Code	Size	ΦD	L	α	A	B	C	W	P
6358	6.3×5.8	6.3	5.8	+0.4 -0.1	6.6	6.6	7.3	0.5~0.8	2.1
6377	6.3×7.7	6.3	7.7	0.3	6.6	6.6	7.3	0.5~0.8	2.1

◆ Marking





CSN Series

◆ Case size & Permissible rated ripple current

Nominal Capacitance (μF)	6.3V		10V		16V		25V		35V		50V	
	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)	Case size ΦD×L (mm)	Max. Rated ripple current @105°C 120Hz (mA rms)
4.7											6.3×5.8	20
10							6.3×5.8	27	6.3×5.8	29	6.3×7.7	36
22			6.3×5.8	33	6.3×5.8	37	6.3×7.7	50	6.3×7.7	54		
33	6.3×5.8	37	6.3×5.8	41	6.3×5.8	49	6.3×7.7	61				
47	6.3×5.8	45	6.3×7.7	61	6.3×7.7	75						
100	6.3×7.7	82	6.3×7.7	85								

◆ RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Vdc	Frequency (Hz)				
	50	120	300	1K	10K~
6.3~50	0.70	1.00	1.17	1.36	1.50

◆ PART NUMBERING SYSTEM

