

SAMXON®

Aluminum Electrolytic Capacitors

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PRODUCT CATALOGUE

IEC QUALITY ASSUREMENT SYSTEM (IECQ)
covering Electronics Components,
Assemblies, Related Materials and Processes
For rules and details of the IECQ visit www.iecqc.org

IECQ Certificate of Conformity Hazardous Substance Process Management

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Applicable to:

- European Directive 2011/65/EU (RoHS – Restriction of the Use of Certain Hazardous Substances) in electrical and electronic equipment, including all published amendments
- European Directive 2012/19/EU (WEEE – waste electrical and electronic equipment) recast
- European Regulation EC No. 1007/2006 (PbACC) and its amendments
- China – RoHS 2 2016-01-21 (Proclamation Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products)

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China

The organization has developed and implemented Hazardous Substance Process Management procedures and processes which have been assessed and found to comply with the applicable requirements for IECQ HSPPM organization approval which is in accordance with the Basic Rules IECQ 011 and Rules of Procedure IECQ 03-5 IECQ Hazardous Substances Process Management of the IEC Quality Assessment System for Electronic Components (IECQ), and with respect to the IECQ Specification.

- IECQ QD 000000.2017 - Hazardous Substance Process Management System Requirements

This Certificate is applicable to all electronic components, assemblies, related materials and processes for the following scope of activities:
Design and Manufacture of Aluminium Electrolytic Capacitors

Issued by the Certification Body: **BSI**

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PT

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IECQ01 Rev. 02

ISO 14001



ACCREDITED

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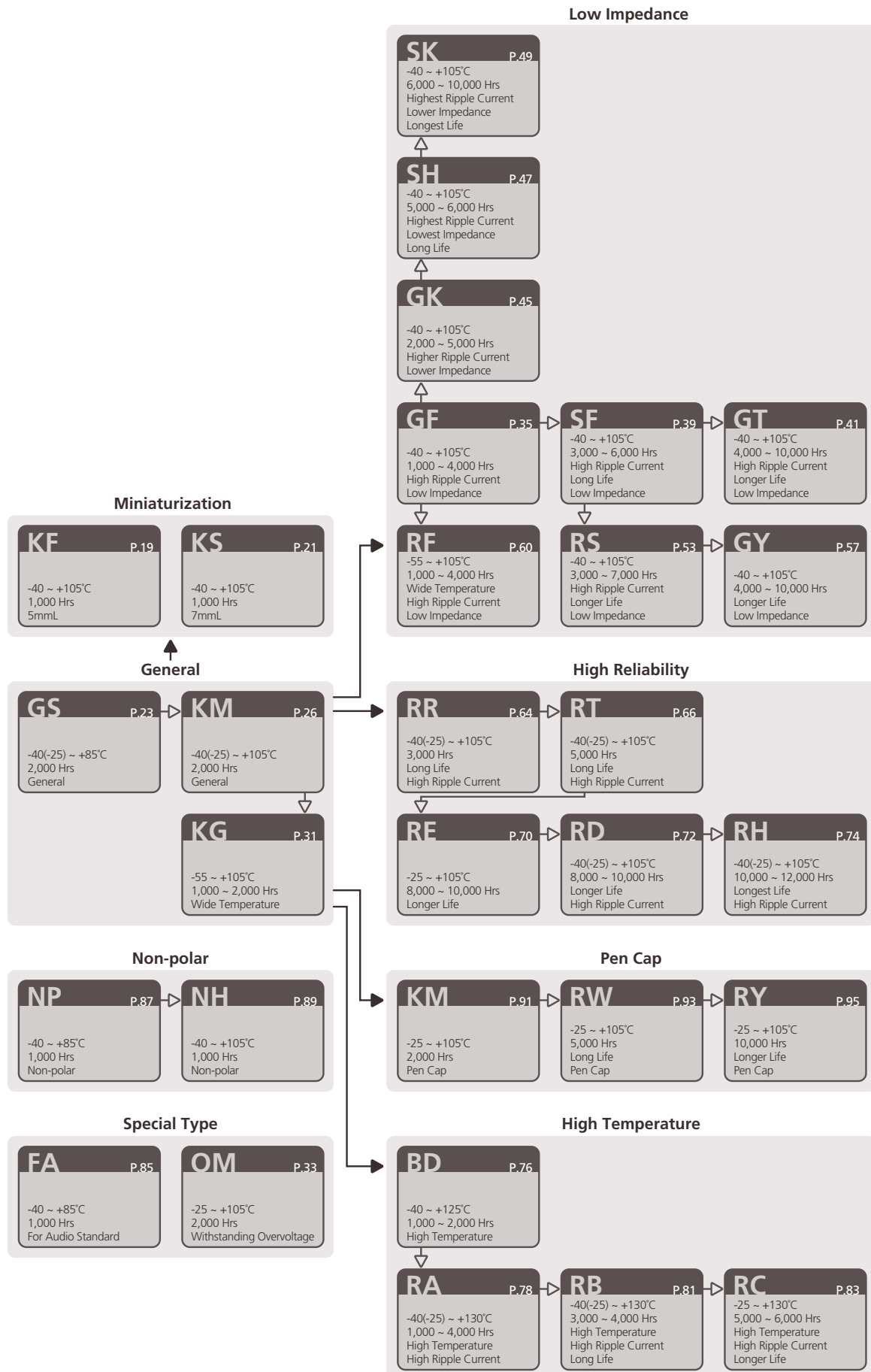
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Series Chart (產品體系圖)

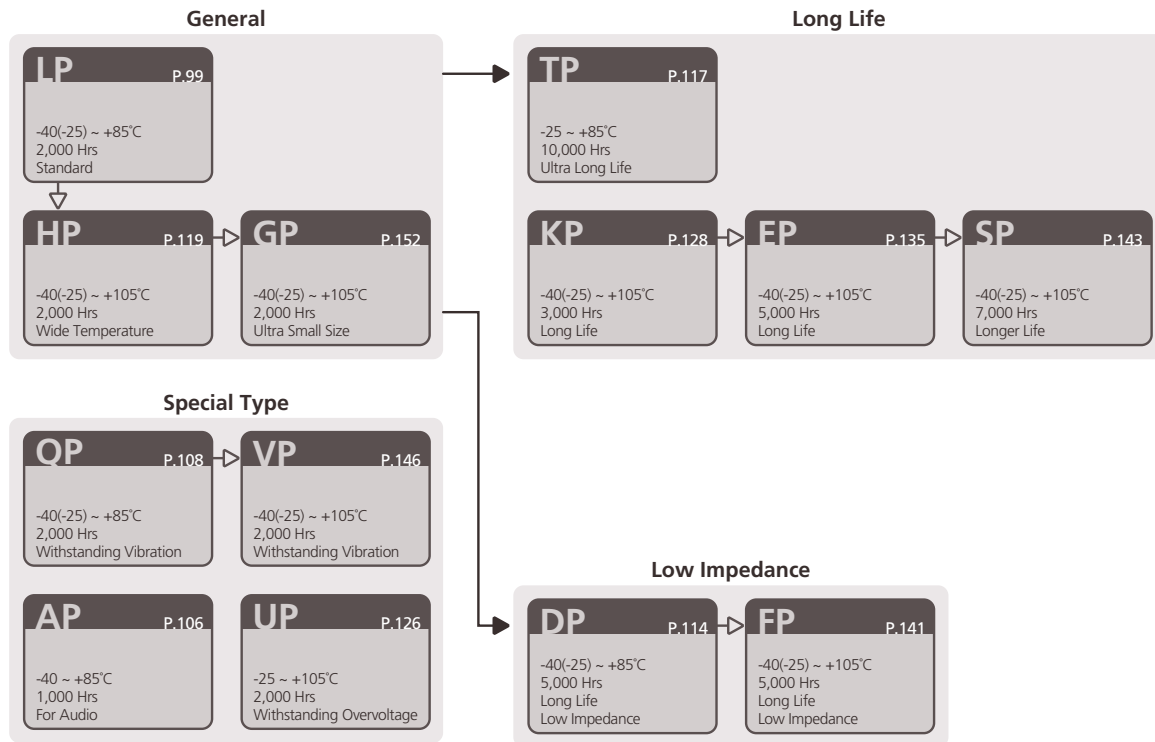
Radial Lead Type

導針型



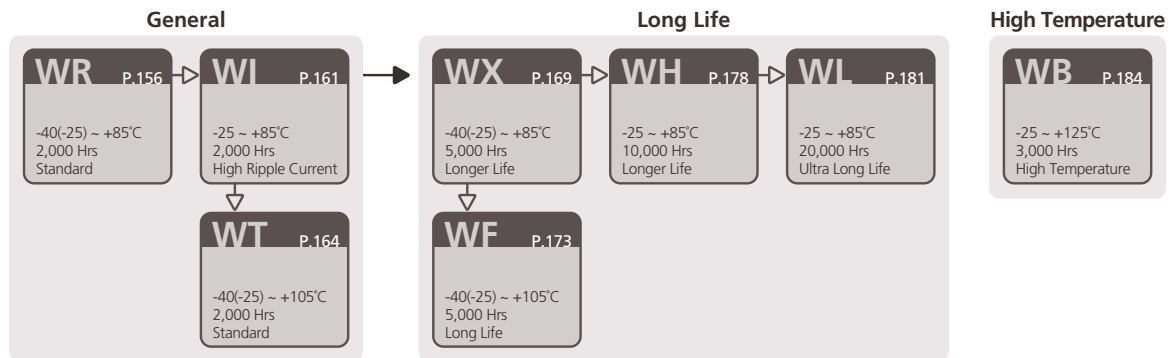
Lug / Snap-in Terminal Type

插入/自立型



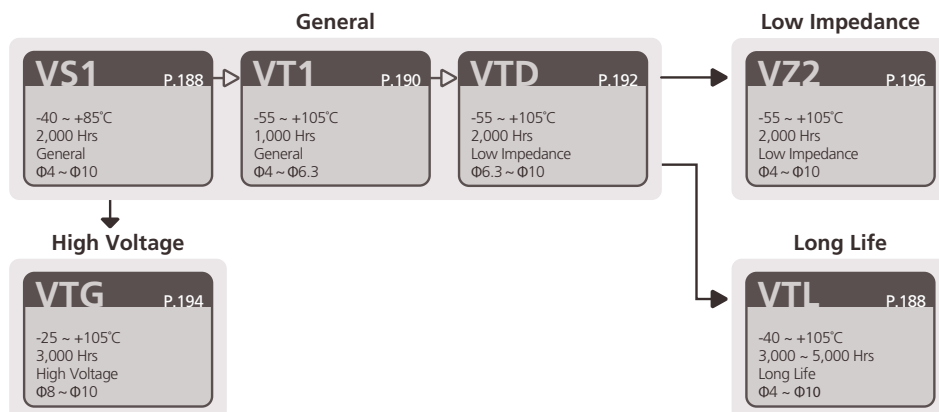
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Surface Mount Type

貼片型



Series Table (產品一覽表)

Series	Features (特點)	Letter Color	Sleeve Color	Temp. (°C)	Voltage (VDC)	Cap. (μF)	Load Life	Page
Miniature Aluminum Electrolytic Capacitors								小型鋁電解電容器
Miniature Type								小型品
KF	5mmL (高), +105°C	White (白)	Black (黑)	-40 ~ +105	4 ~ 50	3.3 ~ 330	1,000 Hrs.	P.19
KS	7mmL (高), -40°C ~ +105°C	White (白)	Black (黑)	-40 ~ +105	6.3 ~ 50	3.3 ~ 330	1,000 Hrs.	P.21
General Purpose								普通品
GS	+85°C, General (普通品)	White (白)	Dark Blue (深藍)	-40(-25) ~ +85	6.3 ~ 450	2.2 ~ 22000	2,000 Hrs.	P.23
KM	+105°C, General (普通品)	White (白)	Black (黑)	-40(-25) ~ +105	6.3 ~ 550	0.47 ~ 33000	2,000 Hrs.	P.26
KG	-55 ~ +105°C, Wide Temperature (寬溫度)	White (白)	Black (黑)	-55 ~ +105	6.3 ~ 100	2.2 ~ 22000	1,000 ~ 2,000 Hrs.	P.31
OM	+105°C, Withstanding Overvoltage (耐過電壓品)	White (白)	Black (黑)	-25 ~ +105	200 & 400	22 ~ 330	2,000 Hrs.	P.33
Low Impedance Type								低阻抗品
GF	+105°C, High Ripple Current, Low Impedance (高紋波, 低阻抗)	White (白)	Sea Green (海綠)	-40 ~ +105	6.3 ~ 100	3.3 ~ 4700	1,000 ~ 4,000 Hrs.	P.35
SF	+105°C, High Ripple Current, Long Life Assurance, Low Impedance (高紋波, 長壽命, 低阻抗)	White (白)	Black (黑)	-40 ~ +105	6.3 ~ 100	15 ~ 3900	3,000 ~ 6,000 Hrs.	P.39
GT	+105°C, High Ripple Current, Longer Life Assurance, Low Impedance (高紋波, 較長壽命, 低阻抗)	Silver (銀)	Black (黑)	-40 ~ +105	6.3 ~ 100	15 ~ 4700	4,000 ~ 10,000 Hrs.	P.41
GK	+105°C, Higher Ripple Current, Lower Impedance (較高紋波, 較低阻抗)	White (白)	Sea Green (海綠)	-40 ~ +105	6.3 ~ 25	100 ~ 3900	2,000 ~ 5,000 Hrs.	P.45
SH	+105°C, Highest Ripple Current, Lowest Impedance, Long Life Assurance (更高紋波, 更低阻抗, 長壽命)	White (白)	Black (黑)	-40 ~ +105	6.3 ~ 50	100 ~ 8200	5,000 ~ 6,000 Hrs.	P.47
SK	+105°C, Highest Ripple Current, Longest Life Assurance, Lower Impedance (更高紋波, 更長壽命, 較低阻抗)	Silver (銀)	Black (黑)	-40 ~ +105	6.3 ~ 100	33 ~ 8200	6,000 ~ 10,000 Hrs.	P.49
RS	+105°C, High Ripple Current, Longer Life Assurance, Low Impedance (高紋波, 較長壽命, 低阻抗)	White (白)	Black (黑)	-40 ~ +105	6.3 ~ 100	15 ~ 4700	3,000 ~ 7,000 Hrs.	P.53
GY	+105°C, Longer Life Assurance, Low Impedance (較長壽命, 低阻抗)	White (白)	Black (黑)	-40 ~ +105	6.3 ~ 100	2.2 ~ 15000	4,000 ~ 10,000 Hrs.	P.57
RF	-55 ~ +105°C, Wide Temperature, High Ripple Current, Low Impedance (寬溫度, 高紋波, 低阻抗)	White (白)	Black (黑)	-55 ~ +105	6.3 ~ 100	22 ~ 4700	1,000 ~ 4,000 Hrs.	P.60
High Reliability Type								高可靠品
RR	Long Life Assurance, High Ripple Current (長壽命, 高紋波)	White (白)	Black (黑)	-40(-25) ~ +105	160 ~ 500	1 ~ 220	3,000 Hrs.	P.64
RT	Long Life Assurance, High Ripple Current (長壽命, 高紋波)	White (白)	Black (黑)	-40(-25) ~ +105	160 ~ 500	1 ~ 220	5,000 Hrs.	P.66
RE	Longer Life Assurance (較長壽命)	White (白)	Black (黑)	-25 ~ +105	160 ~ 450	1 ~ 220	8,000 ~ 10,000 Hrs.	P.70
RD	Longer Life Assurance, High Ripple Current (較長壽命, 高紋波)	White (白)	Black (黑)	-40(-25) ~ +105	160 ~ 500	1 ~ 330	8,000 ~ 10,000 Hrs.	P.72
RH	Longest Life Assurance, High Ripple Current (更長壽命, 高紋波)	White (白)	Black (黑)	-40(-25) ~ +105	160 ~ 500	1 ~ 220	10,000 ~ 12,000 Hrs.	P.74
High Temperature Type								高溫品
BD	+125°C, High Temperature (高溫度)	White (白)	Black (黑)	-40 ~ +125	10 ~ 50	3.3 ~ 3900	1,000 ~ 2,000 Hrs.	P.76
RA	+130°C, High Temperature, High Ripple Current (高溫度, 高紋波)	White (白)	Black (黑)	-40(-25) ~ +130	10 ~ 450	1 ~ 4700	1,000 ~ 4,000 Hrs.	P.78
RB	+130°C, High Temperature, High Ripple Current, Long Life Assurance (高溫度, 高紋波, 長壽命)	White (白)	Black (黑)	-40(-25) ~ +130	160 ~ 450	1.5 ~ 100	3,000 ~ 4,000 Hrs.	P.81
RC	+130°C, High Temperature, High Ripple Current, Longer Life Assurance (高溫度, 高紋波, 較長壽命)	White (白)	Black (黑)	-25 ~ +130	160 ~ 450	1.5 ~ 100	5,000 ~ 6,000 Hrs.	P.83
For Audio Type								音響用品
FA	Standard, For Audio (標準品, 音響電容)	White (白)	Coffee (咖啡)	-40 ~ +85	6.3 ~ 100	2.2 ~ 10000	1,000 Hrs.	P.85
Non-polarized Type								無極性品
NP	+85°C, Non-polar (無極性)	Black (黑)	Green (綠)	-40 ~ +85	6.3 ~ 100	2.2 ~ 6800	1,000 Hrs.	P.87
NH	+105°C, Non-polar (無極性)	White (白)	Black (黑)	-40 ~ +105	6.3 ~ 100	2.2 ~ 1000	1,000 Hrs.	P.89
Pen Cap Type								筆型電容
KM	+105°C, Pen Cap (筆型電容)	White (白)	Black (黑)	-25 ~ +105	200 ~ 450	22 ~ 270	2,000 Hrs.	P.91
RW	+105°C, Pen Cap, Long Life Assurance (筆型電容, 長壽命)	White (白)	Black (黑)	-25 ~ +105	200 ~ 450	22 ~ 220	5,000 Hrs.	P.93
RY	+105°C, Pen Cap, Longer Life Assurance (筆型電容, 較長壽命)	White (白)	Black (黑)	-25 ~ +105	200 ~ 450	22 ~ 220	10,000 Hrs.	P.95
Large Can Aluminum Electrolytic Capacitors								大型鋁電解電容器
Standard Type								標準品
LP	Lug / Snap-in Terminal Type, Standard (插入/自立型, 標準品)	White (白)	Black (黑)	-40(-25) ~ +85	10 ~ 700	56 ~ 82000	2,000 Hrs.	P.99
AP	Lug / Snap-in Terminal Type, For Audio (插入/自立型, 音響電容)	White (白)	Coffee (咖啡)	-40 ~ +85	16 ~ 100	680 ~ 10000	1,000 Hrs.	P.106
QP	Lug / Snap-in Terminal Type, Withstanding Vibration (插入/自立型, 耐振動)	White (白)	Black (黑)	-40(-25) ~ +85	10 ~ 500	56 ~ 82000	2,000 Hrs.	P.108
DP	Lug / Snap-in Terminal Type, Long Life Assurance, Low Impedance (插入/自立型, 長壽命, 低阻抗)	White (白)	Black (黑)	-40(-25) ~ +85	160 ~ 650	47 ~ 2200	5,000 Hrs.	P.114
TP	Lug / Snap-in Terminal Type, Ultra Long Life Assurance (插入/自立型, 超長壽命)	White (白)	Black (黑)	-25 ~ +85	200 ~ 450	56 ~ 2200	10,000 Hrs.	P.117

Series Table (產品一覽表)

Series	Features (特點)	Letter Color	Sleeve Color	Temp. (°C)	Voltage (VDC)	Cap. (μF)	Load Life	Page
Large Can Aluminum Electrolytic Capacitors								大型鋁電解電容器
High Reliability Type								高可靠品
HP	Lug / Snap-in Terminal Type, Wide Temperature (插入/自立型, 寬溫度)	White (白)	Black (黑)	-40(-25) ~ +105	10 ~ 600	47 ~ 56000	2,000 Hrs.	P.119
UP	Lug / Snap-in Terminal Type, Withstanding Overvoltage (插入/自立型, 耐過電壓品)	White (白)	Black (黑)	-25 ~ +105	200 ~ 450	56 ~ 1200	2,000 Hrs.	P.126
KP	Lug / Snap-in Terminal Type, Long Life Assurance (插入/自立型, 長壽命)	White (白)	Black (黑) *Blue (藍)	-40(-25) ~ +105	10 ~ 600	47 ~ 56000	3,000 Hrs.	P.128
EP	Lug / Snap-in Terminal Type, Long Life Assurance (插入/自立型, 長壽命)	White (白)	Black (黑) *Blue (藍)	-40(-25) ~ +105	10 ~ 550	82 ~ 47000	5,000 Hrs.	P.135
FP	Lug / Snap-in Terminal Type, Long Life Assurance, Low Impedance (插入/自立型, 長壽命, 低阻抗)	Silver (銀)	Black (黑)	-40(-25) ~ +105	10 ~ 450	100 ~ 33000	5,000 Hrs.	P.141
SP	Lug / Snap-in Terminal Type, Longer Life Assurance (插入/自立型, 較長壽命)	White (白)	Black (黑)	-40(-25) ~ +105	160 ~ 450	39 ~ 2200	7,000 Hrs.	P.143
VP	Lug / Snap-in Terminal Type, Withstanding Vibration (插入/自立型, 耐振動)	White (白)	Black (黑)	-40(-25) ~ +105	10 ~ 500	39 ~ 56000	2,000 Hrs.	P.146
GP	Lug / Snap-in Terminal Type, Ultra Small Size (插入/自立型, 超小體積)	White (白)	Black (黑)	-40(-25) ~ +105	160 ~ 450	100 ~ 3300	2,000 Hrs.	P.152
Screw Terminal Type								螺釘型
WR	+85°C, Screw Terminal Type, Standard (螺釘型, 標準品)	Silver (銀)	Black (黑)	-40(-25) ~ +85	10 ~ 630	100 ~ 680000	2,000 Hrs.	P.156
WI	+85°C, Screw Terminal Type, High Ripple Current (螺釘型, 高紋波)	Silver (銀)	Black (黑)	-25 ~ +85	350 ~ 450	390 ~ 22000	2,000 Hrs.	P.161
WT	+105°C, Screw Terminal Type, Standard (螺釘型, 標準品)	Silver (銀)	Black (黑)	-40(-25) ~ +105	10 ~ 500	180 ~ 680000	2,000 Hrs.	P.164
WX	+85°C, Screw Terminal Type, Long Life Assurance (螺釘型, 長壽命)	Silver (銀)	Black (黑)	-40(-25) ~ +85	10 ~ 550	1000 ~ 1500000	5,000 Hrs.	P.169
WF	+105°C, Screw Terminal Type, Long Life Assurance (螺釘型, 長壽命)	Silver (銀)	Black (黑)	-40(-25) ~ +105	10 ~ 500	330 ~ 390000	5,000 Hrs.	P.173
WH	+85°C, Screw Terminal Type, Longer Life Assurance (螺釘型, 較長壽命)	Silver (銀)	Black (黑)	-25 ~ +85	350 ~ 500	470 ~ 22000	10,000 Hrs.	P.178
WL	+85°C, Screw Terminal Type, Ultra Long Life Assurance (螺釘型, 超長壽命)	Silver (銀)	Black (黑)	-25 ~ +85	350 ~ 450	2200 ~ 12000	20,000 Hrs.	P.181
WB	+125°C, Screw Terminal Type, High Temperature (螺釘型, 高溫度)	Silver (銀)	Black (黑)	-25 ~ +125	160 ~ 400	330 ~ 15000	3,000 Hrs.	P.184
V-Chip Aluminum Electrolytic Capacitors								貼片式鋁電解電容器
Surface Mount Type								貼片品
VS1	+85°C, Surface Mount Type, General Purpose (貼片普通品)			-40 ~ +85	6.3 ~ 50	0.1 ~ 1500	2,000 Hrs.	P.188
VT1	+105°C, Surface Mount Type, General Purpose, 1,000 Hours (貼片普通品)			-55 ~ +105	6.3 ~ 50	0.1 ~ 220	1,000 Hrs.	P.190
VTD	+105°C, Surface Mount Type, General Purpose, 2,000 Hours (貼片普通品)			-55 ~ +105	25 ~ 100	4.7 ~ 1500	2,000 Hrs.	P.192
VTG	+105°C, Surface Mount Type, High Voltage, 3,000 Hours (高壓貼片品)			-25 ~ +105	400	2.2 ~ 4.7	3,000 Hrs.	P.194
VZ2	+105°C, Surface Mount Type, Low Impedance (低阻抗貼片品)			-55 ~ +105	6.3 ~ 100	1 ~ 1500	2,000 Hrs.	P.196
VTL	+105°C, Surface Mount Type, Long Life, 3,000/5,000 Hours (長壽命貼片品)			-40 ~ +105	10 ~ 50	0.1 ~ 1000	3,000/5,000Hrs.	P.198

* Automotive



Application Guidelines (應用指引)

1. Circuit Design

- 1.1 Please make sure the environment and mounting conditions to which the capacitor will be exposed are within the conditions specified in this catalog (or alternate SAMXON'S specifications, such as series drawings).
- 1.2 Operating temperature and applied ripple current must be within SAMXON'S specification.
 - The capacitor must not be used in an ambient temperature which exceeds the operating temperature specified in this catalog.
 - Do not apply excessive current which exceeds the allowable ripple current.
- 1.3 Appropriate capacitors which comply with the life requirement of the products should be selected when designing the circuit.
- 1.4 Aluminum electrolytic capacitors are polarized. Do not apply reverse voltage or AC voltage. Please use non-polar capacitors for a circuit that can possibly see reversed polarity. Note: Even non-polar capacitors cannot be used for AC voltage application.
- 1.5 Do not use aluminum electrolytic capacitors in a circuit that requires rapid and very frequent charge/discharge. In this type of circuit, it is necessary to use a special design capacitor with extended life characteristics.
- 1.6 Do not apply excess voltage.
 - Please pay attention so that the peak voltage, which is DC voltage overlapped by ripple current, will not exceed the rated voltage.
 - In the case where more than 2 aluminum electrolytic capacitors are used in series, please make sure that applied voltage will be lower than rated voltage and the voltage will be applied to each capacitor equally using a balancing resistor in parallel with the capacitor.
- 1.7 Outer sleeve of the capacitor is not guaranteed as an electrical insulator.
 - Do not use a standard sleeve on a capacitor in applications that require the electrical insulation. When the application requires special insulation, please contact our sales office for details.
 - Do not connect the blank terminal (reinforcing terminal) of a multi-terminal (three- or four-terminal) product of the snap-in type to another circuit it may cause a short circuit.
- 1.8 Capacitors must not be used under the following conditions:
 - Capacitors must not be exposed to water (including condensation), brine or oil.
 - Ambient conditions that include toxic gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonium, etc.
 - Ambient conditions that expose the capacitor to ozone, ultraviolet ray and radiation.
 - Severe vibration and physical shock conditions that exceed SAMXON'S specifications.
- 1.9 When designing a circuit board, please pay attention to following:
 - Make the hole spacing on the P.C. board match the lead spacing of the capacitor.
 - There should not be any circuit pattern or circuit wire above the capacitor safety vent.
 - Unless otherwise specified, following clearance should be made above the safety vent.

Case Diameter	Gap Required
Φ6.3~16	2mm or more
Φ18~35	3mm or more
Φ40 or more	5mm or more

- 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.
- Do not install screw terminal capacitor with end seal side down. When you install a screw terminal capacitor in a horizontal mount, the positive terminal must be in the upper position.

- 1.10 The main chemical solution of the electrolyte and the separator paper used in the capacitors are combustible. The electrolyte is conductive. When it comes in contact with the P.C. board, there is a possibility of pattern corrosion or short circuit between the circuit pattern which could in result of smoking or catching fire. Do not locate any circuit pattern beneath the capacitor end seal.
- 1.11 Do not design a circuit board so that heat generating components such as resistor and transistors are placed near an aluminum capacitor or reverse side of P.C. board (under the capacitor).
- 1.12 Electrical characteristics may vary depending on changes in temperature and frequency. Please consider this variation when you design circuits.
- 1.13 When you are designing capacitors for use on double-sided P.C. boards, do not place capacitors on circuit patterns or over the unused holes.
- 1.14 The torque for terminal screw or brackets screws must be within the specified value on SAMXON's drawings.
- 1.15 When you install more than 2 capacitors in parallel, consider the balance of current flowing into the capacitors.

2. Mounting

- 2.1 Once a capacitor has been assembled in the set and power applied, do not attempt to reuse the capacitor in other circuits or application.
- 2.2 Electric potential between positive and negative terminal may exist as a result or returned electromotive force, so please discharge the capacitor using a 1kΩ resistor.
- 2.3 Leakage current of the parts that have been stored for more than 6 months may increase. When leakage current has increased, please perform a voltage treatment using 1kΩ resistor.
- 2.4 Please confirm ratings before installing capacitors on the P.C. board.
- 2.5 Please confirm polarity before installing capacitors on the P.C. board.
- 2.6 Do not drop capacitors on the floor, nor use a capacitor that was dropped.
- 2.7 Be careful not to deform the capacitor during installation.
- 2.8 Please confirm that the lead spacing of the capacitor matches the hole spacing of the P.C. board prior to installation.
- 2.9 Snap-in can type capacitor such as JIS configuration 692, 693, 694 and 695 type should be installed tightly to the P.C. board (allow no gap between the P.C. board and bottom of the capacitor).
- 2.10 Please pay attention that the clinch force is not too strong when capacitors are placed and fixed by an automatic insertion machine.



Application Guidelines (應用指引)

- 2.11 Please pay attention to that the mechanical shock to the capacitor by suction nozzle of the automatic insertion machine or automatic mounter, or by product checker, or by centering mechanism.
- 2.12 Soldering condition must be confirmed to be within SAMXON'S specification.
 - Pb/Sn Type
Flow Soldering: $235 \pm 5^{\circ}\text{C}$ ≤ 10 sec.
Hand Soldering (Soldering iron tip): $350 \pm 10^{\circ}\text{C}$ ≤ 3 sec.
 - Pb-free Type
Flow Soldering: $260 \pm 5^{\circ}\text{C}$ ≤ 10 sec.
Hand Soldering (Soldering iron tip): $400 \pm 10^{\circ}\text{C}$ ≤ 3 sec.
- 2.13 Do not tilt lay down or twist the capacitor body after the capacitor are soldered to the P.C. board.
- 2.14 Do not carry the P.C. board by grasping the soldered capacitor.
- 2.15 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 capacitors shall not be effected by any radiated heat from the soldered P.C. board or other components after soldering.
- 2.16 Do not clean capacitors with halogenated cleaning agent.
- 2.17 Precautions on fixing materials and coating materials.
 - Do not use any ingredients which contain halogen.
 - Please pay attention to remove flux and any contamination which remains in the gap between the end seal and P.C. board and dry that portion well before coating.
 - Please do not apply any material all around the capacitor body but apply it partially.
 - Please contact our sales office to make sure whether the curing condition of coating material would cause any problems.
- 2.18 Do not install screw terminal capacitor with end seal side down. When you install a screw terminal capacitor in a horizontal position, the positive terminal must be in the upper position.

3. Storage

- 3.1 The characteristics of aluminum electrolytic capacitors degrade when stored in a static condition for long period of time. The rate of deterioration depends upon temperature and humidity.
- 3.2 Capacitors should be stored at the temperature of 5°C to 35°C , the humidity of less than 75% RH and out of direct sunlight.
- 3.3 Capacitors that have been stored for long periods normally over one year should be subjected to a "voltage aging" treatment before use. This will reform and repair the oxide dielectric.
- 3.4 Suggested aging procedure is gradually applying the rated voltage to the capacitor(s) for 30 to 60 minutes. If the capacitance still exceeds the specified leakage current value, please do not use it.

4. Disposal

- 4.1 Dispose of capacitors as industrial waste.
- 4.2 Consignment to the waste disposal specialists to handle it professionally.

The above mentioned material according to EIAJ RCR-2367B (issued in March, 2002), titled "Guideline of notabilia for aluminum electrolytic capacitors for use in electronic equipment". Please refer to the book for details.

5. Printed Circuit Board Cleaning

5.1 Foreword

It had been generally accepted that halogen type organic solvents were hazardous to aluminum electrolytic capacitors. This is because an organic solvent can permeate the capacitor through the end seal. Then, the solvent dissolves and free chlorine ion (Cl^- ion), which can corrode the aluminum electrodes. The following measures were previously the only way to avoid this phenomenon.

- Use of cleaning agents, not hazardous to capacitors such as water or alcohol.
- Mount capacitors on PC boards cleaned with a halogen type solvent beforehand.
- Use of epoxy end seals

These measures have disadvantages with respect to working efficiency, cleaning capability, cost etc. Therefore, aluminum electrolytic capacitors which can withstand halogen type cleaning agents are desirable.

5.2 Types of Cleaning Agents

Generally there are three types of cleaning agents.

- Water type
- Alcohol type
- Halogen type

Of these, water and alcohol will have little effect even if they permeate the capacitor. However, halogens can cause corrosion of aluminum foil and tab. Common types of halogen cleaning agents are listed in Table below:

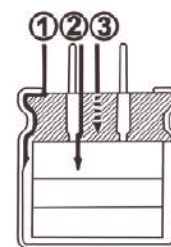
Chemical Name	Structural Formula	Representative Brand Name
Trichlorotrifluoroethane	$\text{C}_2\text{Cl}_3\text{F}_3$	Freon TF, Daiflon S-3
Fluorotrichloromethane	CCl_3F	Freon-11, Daiflon S-1
Trichloroethane	$\text{C}_2\text{H}_3\text{Cl}_3$	Chloroethene
Trichloroethylene	C_2HCl_3	Trichlene
Methyl Chloride	CH_3Cl	MC

The last four solvents listed above are particularly corrosive to aluminum and are not recommended to use as cleaning solvents.

5.3 Penetration Channel of Solvent and Corrosion Mechanism

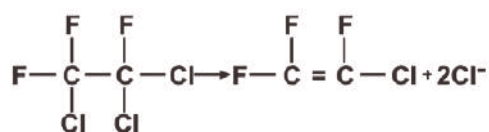
The three channels by which solvents can penetrate into the capacitor are illustrated:

- ① Penetration through a clearance between the rubber and the aluminum case (curled section)
- ② Penetration through a clearance between the rubber and the lead wires
- ③ Permeation through the rubber end seal



To reduce the possibility of solvents entering a capacitor, tight sealing is required to eliminate clearances between the rubber and the aluminum case/lead wires. A solvent resistant rubber material is also a necessity.

When a solvent, for example, trichlorotrifluoroethane gets inside a non anti-solvent capacitor, the chlorine ion is free as shown by the following reaction formula.



This chlorine ion reacts with aluminum as follows:



Then AlCl_3 resolves in water, and it becomes:



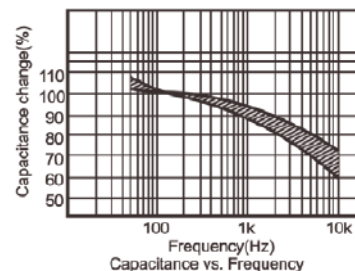
Thus, the Cl^- ion is free again and repeats the corrosion of aluminum. The degree of this reaction depends on the volume of solvent, the ambient temperature of the capacitor in service, the applied voltage and time etc.

Application Guidelines (應用指引)

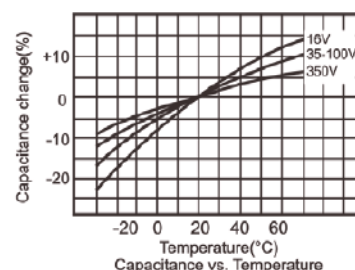
6. Basic Electrical Characteristics Capacitance:

The capacitance of capacitor is determined as AC capacitance by measuring its impedance. As the AC capacitance depends on frequency, voltage and other measuring methods, JIS C 5102 prescribes that the series capacitive component of an equivalent series circuit (○— $\frac{1}{\omega C}$ —○) shall be considered as the capacitance by measuring it at a frequency of 120Hz and a maximum AC voltage of 0.5Vrms with a DC bias voltage of 1.5 to 2.0V applied for aluminum electrolytic capacitors.

The capacitance of an aluminum electrolytic capacitor shows smaller values as a measuring frequency increases. See the typical behavior shown as right chart.



Measuring temperature as well as frequency effects the capacitance. As the measuring temperature decreases, the capacitance shows smaller values. See the typical behavior shown as right chart.



On one hand, DC capacitance, which can be determined by measuring the charge when a DC voltage is applied, shows a slightly larger value than the AC capacitance at a normal temperature and has the flatter characteristic over the temperature range.

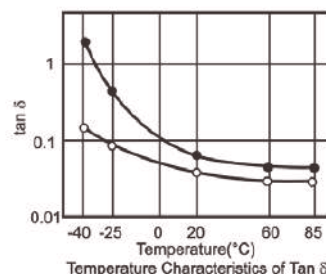
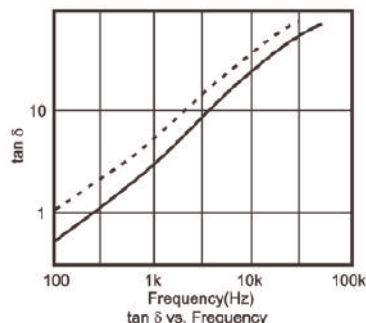
Tan δ (tangent of loss angle or dissipation factor):

The tan δ is the ratio of the resistive component (ESR) to the capacitive reactance ($1/\omega C$) in the equivalent series circuit, and its measuring conditions are the same as the capacitance.

$$\tan \delta = \text{ESR} / (1/\omega C) = \omega C \cdot \text{ESR}$$

Where: ESR = Equivalent series resistor at 120Hz
 $\omega = 2\pi f$
 $f = 120\text{Hz}$

The tan δ show higher values as a measuring frequency increases and a measuring temperature decreases, as follows:



Equivalent Series Resistance (ESR)

The ESR is comprised of the resistance due to aluminum oxide layer and electrolyte/separator combination and other resistance effected with foil length, foil surface area, etc.

The ESR value depends on the temperature. Decreasing the temperature makes the resistivity of the electrolyte increase with the result of the ESR increasing.

As the measuring frequency increases, the ESR decreases and reaches an almost constant value that is mainly the frequency-independent resistance due to electrolyte/separator combination.

Impedance (Z):

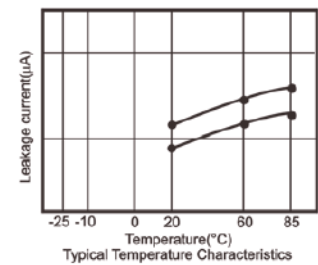
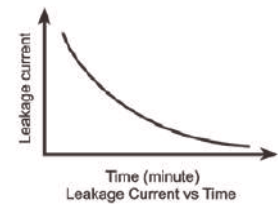
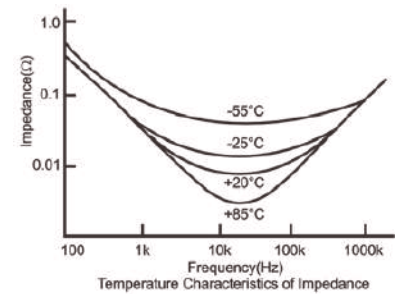
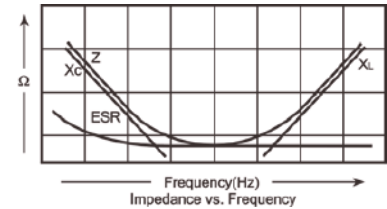
The impedance is the resistance which oppose the flow of alternating current at a specific frequency. It is related to capacitance (C) and inductance (L) in terms of capacitive and inductive reactance, and also related to the ESR. It is expressed as follows:

As shown as right chart, the capacitive reactance (Xc) predominates at the range of low frequencies, and the impedance decreases with increasing frequency until it reaches the ESR in the middle frequency range. At the range of the higher frequencies the inductive reactance (Xl) comes to predominate, so that the impedance increases with increasing the measuring frequency.

As shown as right chart, the impedance value varies with temperature, because the resistance of the electrolyte strongly changes with temperature.

$$Z = \sqrt{ESR^2 + (X_L - X_C)^2}$$

Where: $X_C = 1/\omega C = 1/2\pi fC$
 $X_L = \omega L = 2\pi fL$



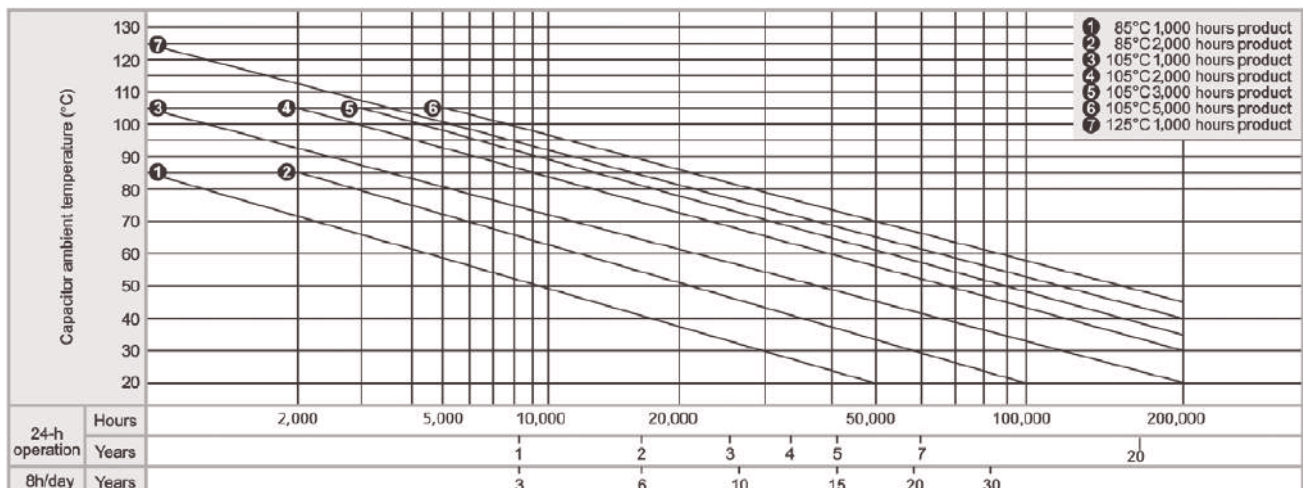
Leakage Current:

The dielectric of a capacitor has a very high resistance which prevents the flow of DC current. However, due to the characteristics of the aluminum oxide layer that functions as a dielectric in contact with electrolyte, a small amount of current, called leakage current, will flow to reform and repair the oxide layer while a voltage is being applied. As shown below, a high leakage current flows in the first minutes as a voltage is applied to the capacitor, and then the leakage current will decrease and reach an almost steady-state value with time.

Measuring temperature and voltage effect the leakage current. The leakage current shows higher values as the temperature and voltage increase.

In general, the leakage current is measured at 20°C by applying the rated voltage, which is applied through a resistor of 1,000Ω connected in series with the capacitor, and several minutes after the capacitor reached the rated voltage. The catalog prescribes the measuring temperature and time.

LIFE ESTIMATION CHART





Application Guidelines (應用指引)

7. Quality Policy

7.1 General

Our basic corporate goals and commitment to total quality are set down in our quality policy. The quality of our products and services is an essential part of our corporate strategy, whose paramount aim is total customer satisfaction. Consistent application of quality management system results in flawless products and a high level of user benefit from our components. Our quality management system always reflects the most stringent international standards.

Our corporate goals is to play a leading role among the world's most competitive companies in electronic components. All quality management measures are geared to optimum customer benefit.

They include:

- Mastery of processes
- Continuous improvement programs to narrow process tolerances, and to increase quality and yield.
- Enhanced productivity
- Continuous optimization of material, capital and human resources.
- Promotion of innovation
- Putting customer benefit first in every product we design. Determining customer needs in partnership with customers, and rapid implementation of agreements.

The SAMXON quality management system, which is documented in the new edition of the company-wide SAMXON Quality Management Handbook, is designed to support this strategy.

7.2 Quality assurance

The required measures and regulations for quality assurance are documented in instructions on operations and procedures; the effectiveness and adequacy of the QA system are regularly checked in internal audits.

7.3 Quality programs

Project-oriented improvement programs pursuing the strategic objective of zero defects are set up and conducted by specialist teams.

7.4 Process assurance

Assurance of production processes starts as early as the planning and development phase. Quality tools like FMEA and SVP help detect and avoid potential errors, and safeguard process capability and product quality. Documentation of all production and testing steps as well as training of personnel are essential to flawless production. Statistical process control (SPC) is used wherever applicable. Permanent availability of plant is ensured by preventive maintenance.

7.5 Incoming inspection

Raw materials, parts and consumable undergo incoming inspection appropriate to their significance in the end product, unless this responsibility has been transferred to the supplier under a quality assurance agreement or similar.

7.6 In-process inspection

Wherever possible, in-process inspection is conducted to certify the conformity not only of intermediate products, but also of process supervision and control (e.g. SPC). It is generally integrated into the process steps and designed to be as preventive as possible, i.e. to avoid errors.

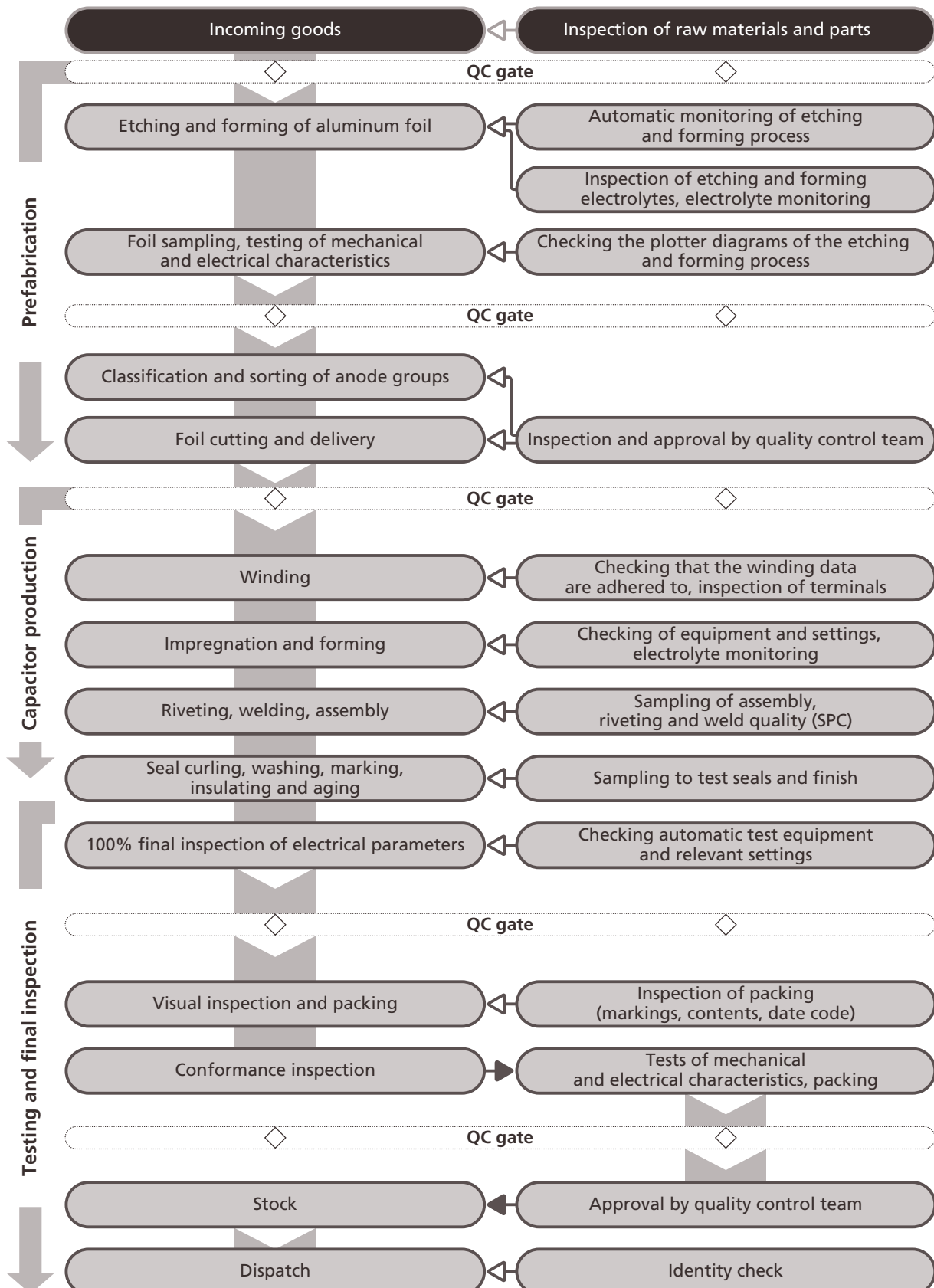
7.7 Final inspection/approval for shipment

Final inspection verifies the major properties of the end products batch by batch, usually by means of fully automated selection tests.

Approval for shipment helps certify that products shipped comply with specifications. It includes:

- Testing of principal parameter,
- Identification check and visual assessment,
- Examination of papers accompanying the batch.

8. Manufacturing and quality assurance procedures for AL electrolytic capacitors





Application Guidelines (應用指引)

9. Environmental

Environmental policy

Our fundamental commitment to protection of the environment is laid down in SAMXON environmental policy:

- We work continuously to lighten the burden on the environment and to reduce consumption of energy and resources beyond statutory requirements.
- We take all precautions to avoid environmental hazards and to prevent damage to the environment.
- Potential impact on the environment is assessed and flows into product and process planning at the earliest possible stage.
- Our environmental management system ensures that our environmental policy is effectively implemented. The technical and organizational procedures required are regularly monitored and constantly upgraded.
- Every employee is required to act in an environmentally conscious manner. It is a permanent task of management to promote awareness of responsibility for the environment at all levels.
- We seek to influence our business associates to follow environmental guidelines similar to ours. We supply our customers with information on environmentally friendly use of our products. We work in a spirit of cooperation with the authorities.
- We inform the public of the environmental impact of our activities and the environmental achievements of our company.

10. Compliance with RoHS Directive

The company is committed to compliance with the European Union Restriction of Hazardous Substance (RoHS) Directive. We hereby guarantee that our products do not contain following materials exceeding the RoHS Directive (2011/65/EU).

- | | |
|---|----------|
| ■ Lead (Pb) and its compounds | ≤1000ppm |
| ■ Mercury (Hg) and its compounds | ≤1000ppm |
| ■ Cadmium (Cd) and its compounds | ≤100ppm |
| ■ Hexavalent chromium, Cr ⁶⁺ , Cr VI | ≤1000ppm |
| ■ Polybrominated biphenyls, PBBs | ≤1000ppm |
| ■ Polybrominated diphenyls, PBDEs | ≤1000ppm |

11. Halogen Free Compliant

The products identified in the catalogue, and their homogeneous subcomponents, do not contain any of the following substances in concentrations greater than the listed maximum limits.

Substance	Maximum Limit (ppm)
Bromine (Br)	900 ppm (0.09%)
Chlorine (Cl)	900 ppm (0.09%)
Total concentration of Chlorine (Cl) + Bromine (Br)	1500 ppm (0.15%)

Part Number System (產品編碼)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
E	GS		105			M	1H		D11			TC		SA		P		
CATEGORY	SERIES		CAPACITANCE			TOLERANCE		VOLTAGE		CASE SIZE			TYPE		SAMXON PRODUCT LINE		SLEEVE MATERIAL	
* ECap V-Chip	Category	Code	Series	Cap (uF)	Code	Tol. (%)	Code	Vol. (W.V.)	Code	Case Size			Feature	Code	SAMXON Product Line			
	ECap	E	KF	0.1	104	±5	J	2	0D	Diameter(Φ)	Code	Radial bulk	RR	For internal use only (The product lines we have H,A,B,C,D,E,M or 0,1,2,3,4,5,9).				
	ECap	A	K5	0.22	224	±10	K	2.5	0E	3	B	Ammo Taping		Sleeve Material			Code	
	V-Chip	V	G5	0.33	334	±15	L	4	0G	3.5	1	2.0mm Pitch	TT					
			KM	0.47	474	±20	M	6.3	0J	4	C	2.5mm Pitch	TU					
			KG	1	105	±30	N	8	0K	5	D	3.5mm Pitch	TV					
			OM	2.2	225	-40	0	10	1A	6.3	E	5.0mm Pitch	TC	PET			P	
			GF	3.3	335	0	W	12.5	1B	8	F	Lead Cut & Form						
			SF	4.7	475	-20	0	16	1C	10	G	CB-Type	CB					
			GT	10	106	-20	+10	20	1D	12.5	I	CE-Type	CE					
			GK	22	226	-20	+10	25	1E	13	J	HE-Type	HE	PVC			If the sleeve material is PVC, there will be blank in seventeenth digit.	
			SK	33	336	-20	+40	30	1I	13.5	V	KD-Type	KD					
			SH	47	476	-20	+40	32	13	14	4	FD-Type	FD					
			SK	100	107	-20	+50	35	1V	14.5	A	EH-Type	EH					
			RS	220	227	-10	0	40	1G	16	K	PCB Terminal		Screw				
			GY	330	337	-10	0	42	1M	16.5	7	Snap-in	SW					
			RF	470	477	-10	+20	50	1H	18	L	SX						
			RR	2200	228	-10	+20	57	1L	18.5	8	SZ						
			RT	22000	229	-10	+30	63	1J	20	M	Lug	SG	PVC				
			RE	33000	339	-10	+30	71	15	22	N	O5						
			RD	47000	479	-10	+50	75	1T	25	O	O6						
			RH	100000	10T	+13	+50	80	1K	30	P	T5						
			BD	150000	15T	-5	+15	85	1R	34	W	T6	PVC					
			RA	220000	22T	-5	+20	90	19	35	Q	D5						
			RB	330000	33T	0	+20	100	2A	40	R	D6						
			RC	1000000	10M	0	+30	120	2O	42	4							
			FA	1500000	15M	0	+20	125	2B	45	6	PVC						
			NP	2200000	22M	0	+20	150	2Z	51	5							
			NH	3300000	33M	0	+30	160	2C	63.5	T							
			RW			0	+50	180	2P	76	U							
			RY			0	+50	200	2D	80	8	PVC						
			LP			0	+50	215	22	90	X							
			AP			+5	+15	220	2N	100	Z							
			QP			+5	+20	230	23	Len. (mm)	Code							
			DP			+5	+20	250	2E	4.5	45	PVC						
			TP			+10	+50	275	2T	5	05							
			HP			+10	+50	300	2I	5.4	54							
			UP					310	2R	7	07							
			KP					315	2F	7.7	77	PVC						
			PK					330	2U	10.2	T2							
		P					350	2V	11	11								
		FP					360	2X	11.5	1A								
		SP					375	2Q	12	12	PVC							
		VP					385	2Y	12.5	1B								
		GP					400	2G	13	13								
		WR					420	2M	13.5	1C								
		WI					450	2W	20	20	PVC							
		WT					500	2H	25	25								
		WX					550	25	29.5	2J								
		WF					600	26	30	30								
		WH					630	2J	31.5	3A	PVC							
		WL							35	35								
		WB							35.5	3E								
		S1							50	50								
		T1							80	80	PVC							
		TD							100	1L								
		TG							105	1K								
		Z2							110	1M								
		TL							120	1N	PVC							
									130	1P								
									140	1Q								
									150	1R								
									155	1E	PVC							
									160	1S								
									165	1F								
									170	1T								
									180	1U	PVC							
									190	1V								
									200	2L								
									215	2A								
									210	2M	PVC							
									220	2N								
									240	2Q								
									250	2R								
									260	2S	PVC							
									270	2T								

Taping Specifications (編帶產品規格)

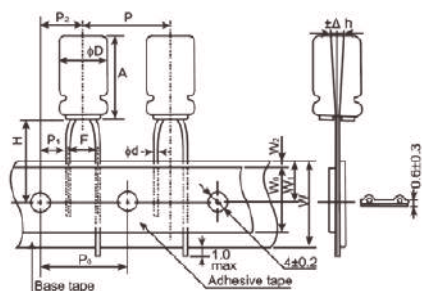


Fig-1

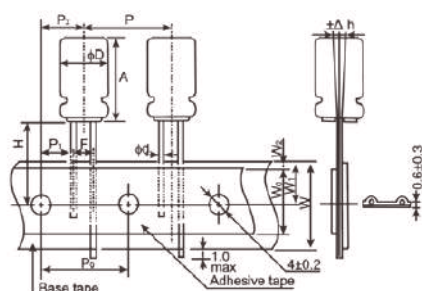


Fig-2

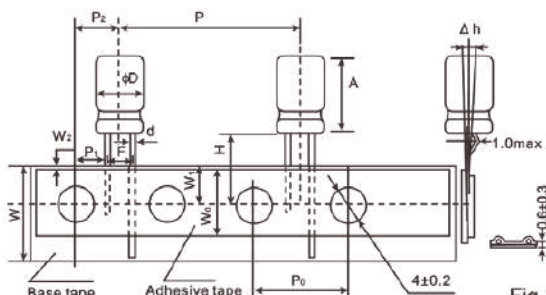


Fig-3

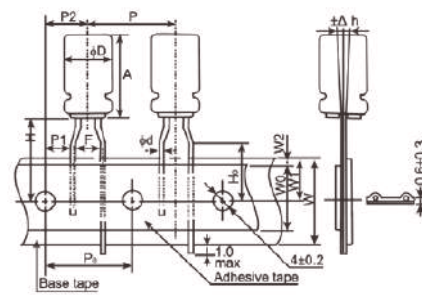
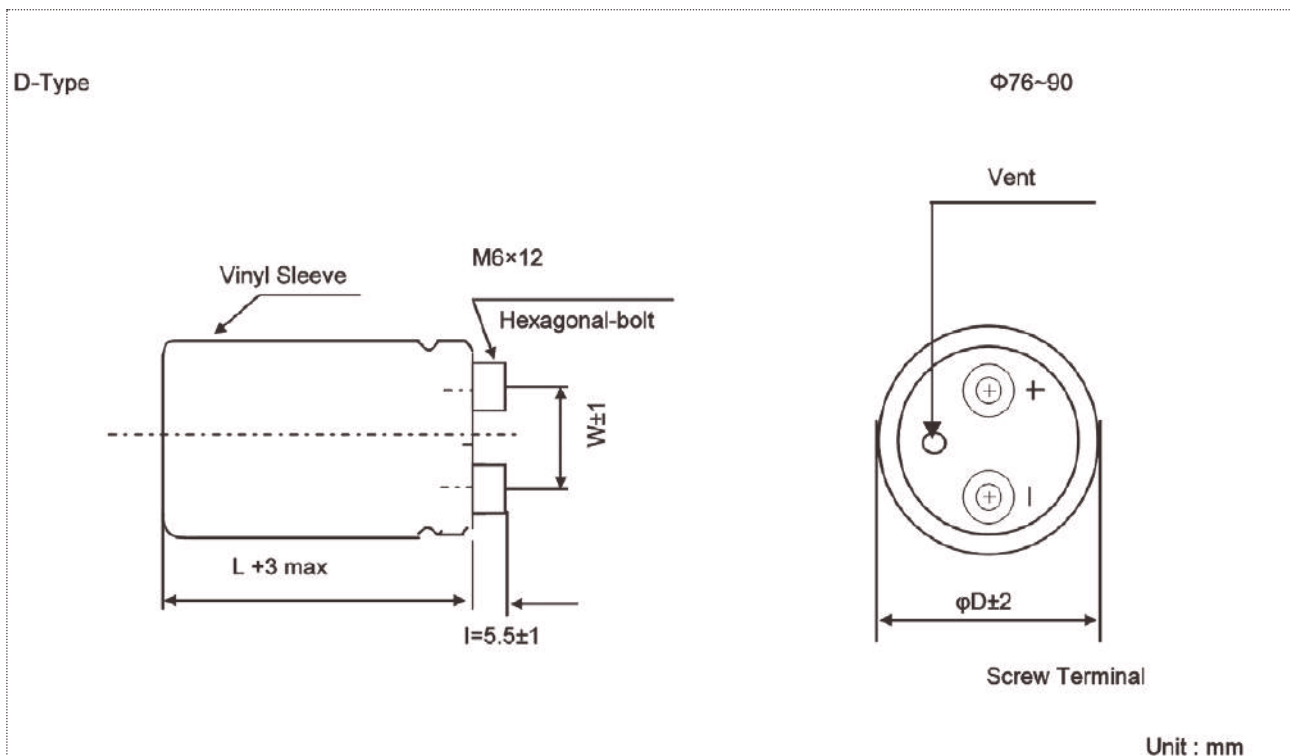
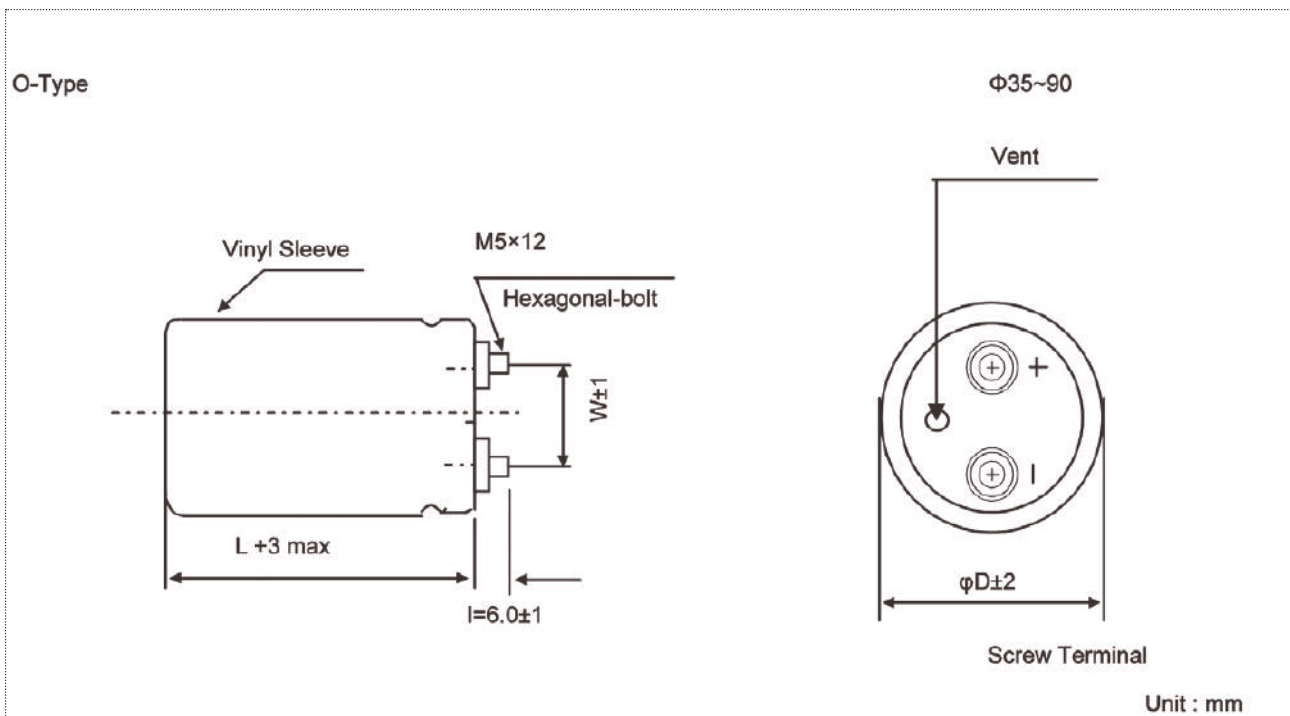


Fig-4

SPECIFICATIONS

Item		Dimensions (mm)													
Reference figure		Fig 1			Fig 2					Fig 3	Fig 4				Tol.
Diameter	D	3	4 ~ 5	5	6.3		8	10	12.5	16, 18	4, 5, 6.3	5, 6.3	8		
Height	A	5	5 ~ 7	9 ~ 15	5 ~ 7	9 ~ 15	11 ~ 20	9 ~ 21	15 ~ 35	15 ~ 40	5 ~ 7	9 ~ 15	5 ~ 9	11 ~ 20	
Lead Diameter	d	0.4	0.45	0.5	0.45	0.5	0.5	0.6	0.6	0.8	0.45	0.5	0.45	0.5	±0.05
Component Spacing	P	12.7			12.7		12.7	12.7	15	30	12.7		12.7		±1.0
Pitch of sprocket holes	P ₀	12.7			12.7		12.7	12.7	15	15	12.7		12.7		±0.2
Distance between centres of component leads	F	2.5			2.5		3.5	5.0	5.0	7.5	5.0		5.0		± ^{0.8} _{0.5}
Carrier tape width	W	18.0			18.0		18.0	18.0	18.0	18.0	18.0		18.0		±0.5
Distance between the center of upper edge of carrier tape and sprocket holes	W ₁	9.0			9.0		9.0	9.0	9.0	9.0	9.0		9.0		±0.5
Distance between the abscissa and the bottom of the components body	H	18.5			18.5		18.5	18.5	18.5	18.5	17.5	18.5	17.5	20.0	± ^{0.75} _{0.5}
Distance between the abscissa and the reference plane of the components with crimped leads	H ₀	—			—		—	—	—	—	16.0		16.0		±0.5
Hold down tape width	W ₀	7.0			7.0		7.0	7.0	12	12	7.0		7.0		Min.
Max. lateral deviation of the component body vertical to the tape plane	Δh	0			0		0	0	0	0	0		0		±1.0
Distance between the upper edges of the carrier tape and the hold down tape	W ₂	0 ~ 3			0 ~ 3		0 ~ 3	0 ~ 3	0 ~ 3	0 ~ 3	0 ~ 3		0 ~ 3		—
Distance between center of terminal and the sprocket holes	P ₁	5.1			5.1		4.6	3.85	5.0	3.75	3.85		3.85		±0.5
Distance between center of the component and sprocket holes	P ₂	6.35			6.35		6.35	6.35	7.5	7.5	6.35		6.35		±1.0

CASE SIZE TABLE



FEATURES

- Small case size, high rated voltage, capacitance and ripple current, stable and reliable performance, forming complete sets of unclear electric station.
- Suitable for use in electronic and industrial equipments such as computer, programming control exchanger for power supplies filtering and energy storing.



SPECIFICATIONS

Item	Performance Characteristics			
Operating Temperature Range	-40 to +85°C	-25 to +85°C		
Rated Working Voltage Range	10 to 100V	160 to 630V		
Nominal Capacitance Range	100 to 680000μF			
Capacitance Tolerance	±20% at 120Hz, +20°C			
Leakage Current	I ≤0.02CV (μA) or 5 (mA) whichever is smaller measured after 5 minutes application of rated working voltage at +20°C			
tan δ (120Hz, +20°C)	The values shown in the STANDARD RATINGS tables			
Low Temperature Characteristics	Impedance ratio max. at 120Hz			
	Working Voltage (V)	10~100	160~630	
	Z-25°C / Z+20°C	—	8	
	Z-40°C / Z+20°C	15	—	
High Temperature Loading	Test time	: 2,000 hours	Post test requirements at +20°C	
	Test temperature	: +85°C	Leakage current	: ≤Initial specified value
	Test conditions	: Rated DC working voltage with rated ripple current	Cap. change	: within ±20% of the initial measured value
			tan δ	: ≤200% of the initial specified value
Shelf Life	At +85°C no voltage applied after 1,000 hours and then being stabilized at +20°C the capacitors shall meet the following limits			
	Leakage current	: ≤Initial specified value		
	Cap. change	: within ±20% of the initial measured value		
	tan δ	: ≤175% of the initial specified value		
Industrial Standard	JIS C - 5101-4 (IEC 60384-4)			

RIPPLE CURRENT MULTIPLIER

Frequency Coefficient

Coefficient \ Freq. (Hz)	50	120	300	1k	10k~
Rated Voltage					
<160V	0.80	1.00	1.08	1.15	1.15
≥160V	0.80	1.00	1.08	1.15	1.20

PART NUMBER SYSTEM (EXAMPLE : 160V 6800 μ F)

1	23	456	7	89	10	1112	1314
E	WR	688	M	2C	S	1L	OO

Type (Terminal Code)

Case Length (100mm)

Diameter (51mm)

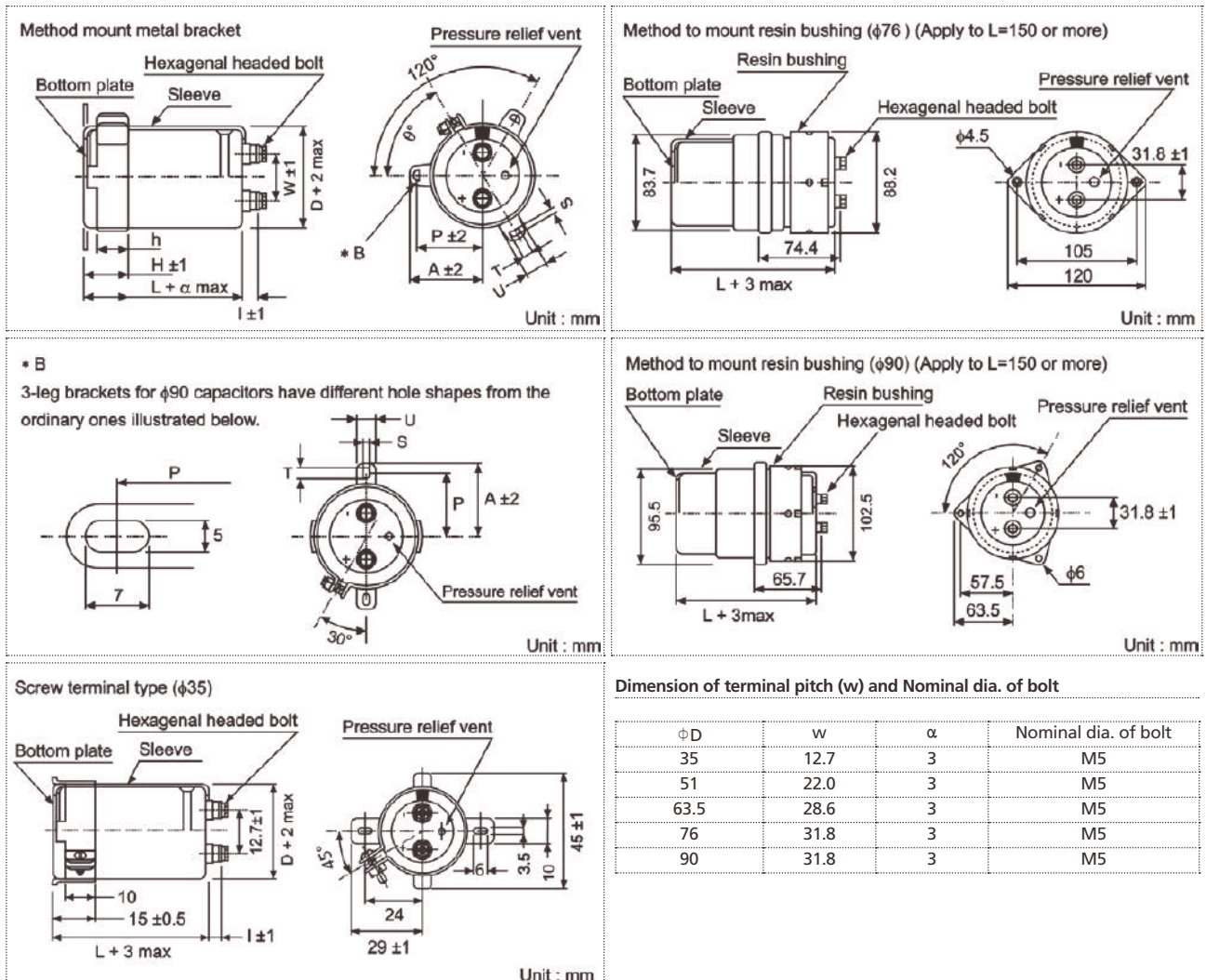
Voltage (160V)

Tolerance ($\pm 20\%$)capacitance (6800 μ F)

Series

E-CAP

CASE SIZE TABLE



Dimensions of mounting bracket

Voltage (Code)		3 - Leg				2 - Leg				
Symbol	φD	51	63.5	76	90	35	51	63.5	76	90
P		32.5	38.1	44.5	50.8	24	33.2	40.5	46.5	53
A		38.5	43	49.2	58.5	29	40	46.5	53	59
T		7.5	8.0	7.0	8.0	6.0	6.0	7.0	6.0	6.0
S		5.0	5.0	5.0	5.0	3.5	4.5	4.5	4.5	4.5
U		12	14	14	18	10	14	14	14	14
θ°		60	60	60	60	30	30	30	30	30
H		20	25	30	35	15	25	35	35	35
h		15	20	24	25	10	15	20	20	20

STANDARD RATINGS

Voltage (Code)		10V (1A)			16V (1C)			25V (1E)		
SV		13			20			32		
Cap. (μF)	Code	Case Size	tan δ	Ripple Current	Case Size	tan δ	Ripple Current	Case Size	tan δ	Ripple Current
18000	189							35 x 50	0.35	4.0
27000	279				35 x 50	0.45	4.2			
39000	399	35 x 50	0.60	4.7				35 x 80	0.40	6.2
47000	479							35 x 100	0.40	7.4
56000	569				35 x 80	0.60	6.5	35 x 120	0.45	8.3
82000	829	35 x 80	0.60	7.0	35 x 100	0.70	8.0	51 x 80	0.50	9.7
100000	10T	35 x 100	0.70	8.0	35 x 120	0.70	9.6	51 x 100	0.60	10.8
120000	12T	35 x 120	0.70	9.4	51 x 80	0.80	9.6	51 x 120	0.60	12.0
150000	15T	51 x 80	0.90	9.8	51 x 100	0.90	11.2			
180000	18T							63.5 x 100	0.75	14.7
220000	22T	51 x 100	1.00	10.3	51 x 120	1.00	14.2	63.5 x 100	0.80	15.0
270000	27T	51 x 120	1.20	12.8	63.5 x 100	1.20	15.3	76 x 100	0.90	18.3
330000	33T				63.5 x 120	1.30	17.1	76 x 120	1.00	20.7
390000	39T	63.5 x 100	1.50	15.3	76 x 100	1.60	18.0	76 x 140	1.20	22.1
470000	47T	63.5 x 120	2.00	16.0	76 x 100	1.80	19.3			
560000	56T	76 x 120	2.50	17.3	76 x 140	2.00	20.7	90 x 140	1.50	25.8
680000	68T	76 x 120	3.00	18.7						

Maximum Allowable Ripple Current (Arms) at 85°C 120Hz
tan δ at 20°C 120Hz

Case Size ΦD x L (mm)

Voltage (Code)		35V (1V)			50V (1H)			63V (1J)		
SV		44			63			79		
Cap. (μF)	Code	Case Size	tan δ	Ripple Current	Case Size	tan δ	Ripple Current	Case Size	tan δ	Ripple Current
5600	568							35 x 50	0.20	3.0
10000	109				35 x 50	0.25	3.9	35 x 80	0.25	4.0
15000	159	35 x 50	0.30	3.9				35 x 100	0.25	5.3
18000	189				35 x 80	0.25	5.2	35 x 120	0.25	6.2
22000	229				35 x 100	0.30	5.7	51 x 80	0.30	6.5
27000	279				35 x 120	0.35	6.6			
33000	339	35 x 80	0.40	6.0				51 x 100	0.35	8.1
39000	399	35 x 100	0.40	6.7	51 x 80	0.40	7.4	51 x 120	0.35	9.5
47000	479	35 x 120	0.45	8.0				63.5 x 100	0.40	10.2
56000	569				51 x 100	0.40	9.8			
68000	689	51 x 80	0.50	8.5	51 x 120	0.45	11.1	63.5 x 120	0.45	12.7
82000	829	51 x 100	0.55	10.3	63.5 x 100	0.50	12.2			
100000	10T	51 x 120	0.60	11.3				76 x 120	0.45	16.7
120000	12T	51 x 120	0.60	12.8	63.5 x 120	0.50	15.0	76 x 140	0.50	19.0
150000	15T	63.5 x 100	0.70	13.2	76 x 115	0.60	17.7	90 x 140	0.55	22.0
					76 x 120	0.60	18.1			
180000	18T	63.5 x 120	0.70	15.3	76 x 140	0.70	19.5			
220000	22T	76 x 100	0.75	17.8						
270000	27T	76 x 120	0.80	18.4	90 x 140	0.80	23.2			
330000	33T	76 x 140	0.90	22.0						
470000	47T	90 x 140	1.00	28.0						

Maximum Allowable Ripple Current (Arms) at 85°C 120Hz
tan δ at 20°C 120Hz

Case Size ΦD x L (mm)

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STANDARD RATINGS

Voltage (Code)		80V (1K)			100V (2A)			160V (2C)		
SV		100			125			200		
Cap. (μF)	Code	Case Size	tan δ	Ripple Current	Case Size	tan δ	Ripple Current	Case Size	tan δ	Ripple Current
1200	128							35 x 50	0.15	2.0
2200	228				35 x 50	0.10	2.1	35 x 80	0.15	3.4
2700	278							35 x 100	0.15	3.7
3300	338	35 x 50	0.15	2.5				35 x 120	0.15	4.5
4700	478				35 x 80	0.15	3.4	51 x 80	0.20	5.6
6800	688	35 x 80	0.20	3.7	35 x 100	0.15	4.2	51 x 100	0.20	7.5
8200	828				35 x 120	0.15	5.0	51 x 120	0.20	8.1
10000	109	35 x 100	0.20	4.9	51 x 80	0.20	5.2	63.5 x 100	0.20	9.8
12000	129	35 x 120	0.20	5.4				63.5 x 120	0.20	10.8
15000	159	51 x 80	0.25	6.0				76 x 100	0.20	12.7
18000	189				51 x 120	0.20	8.1	76 x 120	0.20	14.0
22000	229	51 x 100	0.30	7.1	63.5 x 100	0.25	8.6	76 x 130	0.20	16.6
27000	279	51 x 120	0.30	8.6	63.5 x 120	0.25	10.3	76 x 140	0.20	16.6
33000	339	63.5 x 100	0.35	9.3	76 x 100	0.25	11.1	90 x 140	0.25	18.9
39000	399				76 x 120	0.25	12.4			
47000	479	63.5 x 120	0.35	12.0	76 x 140	0.25	14.3			
68000	689	76 x 120	0.35	15.4	90 x 140	0.30	18.0			
82000	829	76 x 140	0.35	18.1						
100000	10T	90 x 140	0.40	21.0						

Maximum Allowable Ripple Current (Arms) at 85°C 120Hz
tan δ at 20°C 120Hz

Case Size ΦD x L (mm)

Voltage (Code)		200V (2D)			250V (2E)			350V (2V)		
SV		250			300			400		
Cap. (μF)	Code	Case Size	tan δ	Ripple Current	Case Size	tan δ	Ripple Current	Case Size	tan δ	Ripple Current
390	397							35 x 50	0.25	1.9
560	567				35 x 50	0.15	1.3			
680	687							35 x 80	0.25	2.9
820	827	35 x 50	0.15	1.6						
1000	108							35 x 100	0.25	3.8
1200	128				35 x 80	0.15	2.3	35 x 120	0.25	4.2
1500	158				35 x 100	0.15	3.0	51 x 80	0.25	4.5
1800	188	35 x 80	0.15	2.8	35 x 120	0.15	3.3			
2200	228	35 x 100	0.15	3.6	51 x 80	0.15	3.7	51 x 90	0.25	5.8
2700	278	35 x 120	0.15	4.0						
3300	338	51 x 80	0.15	4.5	51 x 100	0.15	5.1	51 x 130	0.25	8.3
3900	398				51 x 120	0.15	5.9	63.5 x 90	0.25	8.0
4700	478	51 x 100	0.15	6.5	63.5 x 95	0.20	6.7	63.5 x 110	0.25	9.2
5600	568	51 x 120	0.15	7.6	63.5 x 100	0.20	6.9	63.5 x 130	0.25	10.9
6800	688							76 x 90	0.25	10.3
8200	828	63.5 x 100	0.20	9.5	63.5 x 120	0.20	8.7	76 x 115	0.25	11.7
10000	109	63.5 x 120	0.20	11.0	76 x 120	0.20	11.1	76 x 130	0.25	14.0
12000	129	76 x 100	0.20	11.5	76 x 150	0.20	12.2	76 x 155	0.25	15.6
15000	159	76 x 120	0.20	12.8	76 x 140	0.20	13.0			
18000	189	76 x 140	0.20	15.0	76 x 155	0.25	16.1			
22000	229	90 x 140	0.25	15.6	90 x 140	0.20	14.9			
					90 x 150	0.20	18.5			
					90 x 155	0.20	19.0			

Maximum Allowable Ripple Current (Arms) at 85°C 120Hz
tan δ at 20°C 120Hz

Case Size ΦD x L (mm)

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STANDARD RATINGS

Voltage (Code)		400V (2G)			450V (2W)			500V (2H)		
SV		450			500			550		
Cap. (μF)	Code	Case Size	tan δ	Ripple Current	Case Size	tan δ	Ripple Current	Case Size	tan δ	Ripple Current
470	477							51 x 80	0.25	1.8
680	687							51 x 105	0.25	2.5
820	827							51 x 105	0.25	2.8
1000	108	51 x 80	0.25	3.4	51 x 80	0.25	3.5	51 x 115	0.25	3.2
1200	128	51 x 80	0.25	3.8	51 x 100	0.25	4.5			
1500	158	51 x 105	0.25	4.5	51 x 105	0.25	5.0	51 x 115	0.25	4.0
								63.5 x 95	0.25	4.0
1800	188	51 x 105	0.25	5.2	51 x 115	0.25	5.6	63.5 x 115	0.25	4.8
		63.5 x 95	0.25	6.4	51 x 130	0.25	6.5			
2200	228	51 x 100	0.25	5.6				63.5 x 130	0.25	5.7
		51 x 140	0.25	6.5	63.5 x 95	0.25	6.5			
2700	278	51 x 130	0.25	7.1	63.5 x 115	0.25	7.8	76 x 115	0.25	6.5
3300	338	63.5 x 115	0.25	8.5	63.5 x 130	0.25	9.1			
					76 x 115	0.25	9.0			
3900	398	63.5 x 130	0.25	9.7	63.5 x 160	0.25	9.5	76 x 130	0.25	8.4
					76 x 115	0.25	9.7			
		63.5 x 160	0.25	10.5	76 x 130	0.25	11.2			
4700	478	76 x 105	0.25	10.3						
		76 x 115	0.25	10.7	90 x 120	0.25	11.5			
		63.5 x 190	0.25	12.0						
5600	568	76 x 115	0.25	11.5	76 x 155	0.25	13.3			
		76 x 130	0.25	12.2						
		76 x 150	0.25	14.4	76 x 155	0.25	14.4			
6800	688	76 x 155	0.25	14.6	76 x 170	0.25	15.0			
					90 x 155	0.25	15.3			
		76 x 155	0.25	14.6						
8200	828	76 x 170	0.25	15.0	90 x 155	0.25	17.0			
		90 x 150	0.25	16.5						
		90 x 155	0.25	16.8						
		76 x 170	0.25	17.5						
10000	109	90 x 130	0.25	17.1	90 x 170	0.25	18.5			
		90 x 150	0.25	18.2						
		90 x 155	0.25	18.5						
		90 x 160	0.25	18.7						
12000	129	90 x 170	0.25	20.5	90 x 230	0.25	23.5			
15000	159	90 x 230	0.25	26.5						

Maximum Allowable Ripple Current (Arms) at 85°C 120Hz
tan δ at 20°C 120Hz

Case Size ΦD x L (mm)

Voltage (Code)		550V (25)			600V (26)			630V (2J)		
SV		600			650			680		
Cap. (μF)	Code	Case Size	tan δ	Ripple Current	Case Size	tan δ	Ripple Current	Case Size	tan δ	Ripple Current
100	107	35 x 50	0.25	0.6						
180	187	35 x 80	0.25	1.0						
270	277	35 x 100	0.25	1.3						
330	337	35 x 120	0.25	1.6						
390	397	51 x 80	0.25	1.7						
		51 x 100	0.25	2.1						
560	567	63.5 x 120	0.25	2.5						
		51 x 130	0.25	2.7						
680	687	63.5 x 130	0.25	3.0						
		51 x 130	0.25	3.1						
820	827	63.5 x 100	0.25	3.5						
1000	108				63.5 x 120	0.30	5.3	63.5 x 130	0.30	5.9
1200	128	76 x 100	0.25	4.2	76 x 100	0.30	6.0	76 x 110	0.30	6.7
1500	158	76 x 100	0.25	4.6	76 x 120	0.30	7.3	76 x 130	0.30	8.1
1800	188	76 x 100	0.25	5.2	76 x 140	0.30	8.6	76 x 150	0.30	9.6
2200	228	76 x 110	0.25	5.9	90 x 120	0.30	9.6	90 x 130	0.30	10.7
2700	278				90 x 140	0.30	11.3	90 x 150	0.30	12.6
3300	338	76 x 140	0.25	8.0	90 x 160	0.30	13.2	90 x 170	0.30	14.7
3900	398				90 x 180	0.30	15.6	90 x 190	0.30	17.3

Maximum Allowable Ripple Current (Arms) at 85°C 120Hz
tan δ at 20°C 120Hz

Case Size ΦD x L (mm)

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