

# X-CON<sup>®</sup>

## Conductive Polymer Aluminum Solid Capacitors



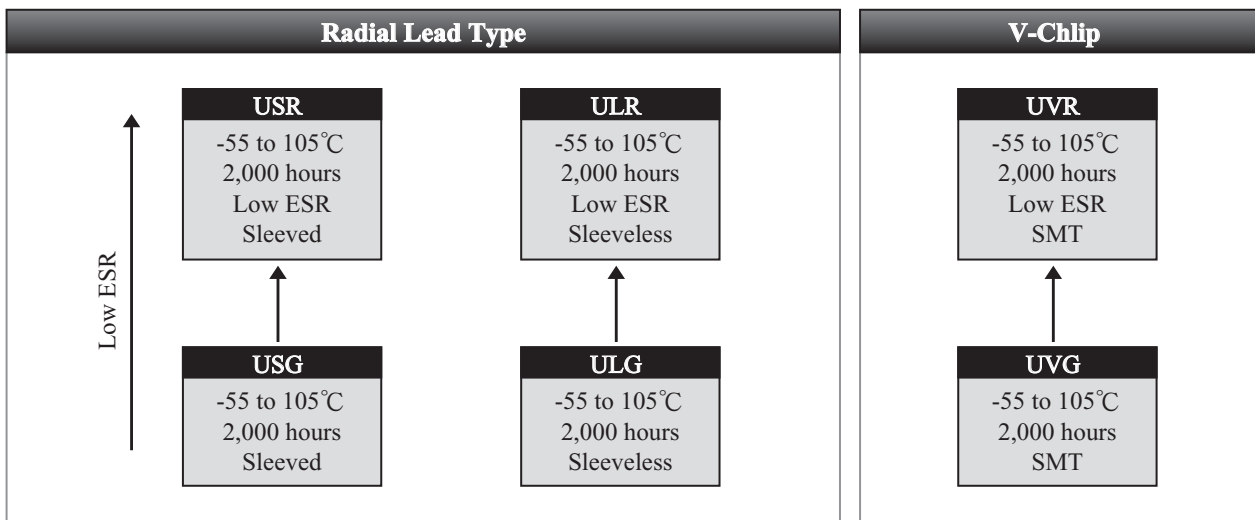
2006 - 2007

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Selection Guide	Series	Capacitance (µF)	Voltage (VDC)	Load Life	Appearance	Pages
	ULG	68 to 1500	2.5 to 25	2000 hours at +105°C	Sleeveless	5 to 6
	USG				Sleeved	7 to 8
	ULR	330 to 2700	2.5 to 16	2000 hours at +105°C	Sleeveless, Low ESR	9 to 10
	USR				Sleeved, Low ESR	11 to 12
	UVG	100 to 1500	2.5 to 20	2000 hours at +105°C	V-chip	13 to 14
	UVR				V-chip, Low ESR	15 to 16

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Series Chart



Conductive Polymer Aluminum Solid Capacitors

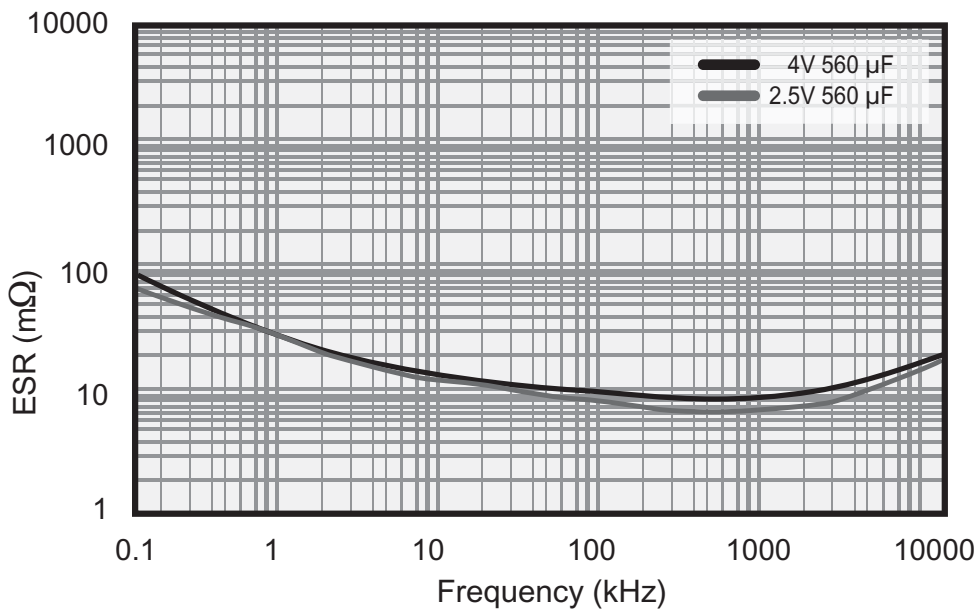
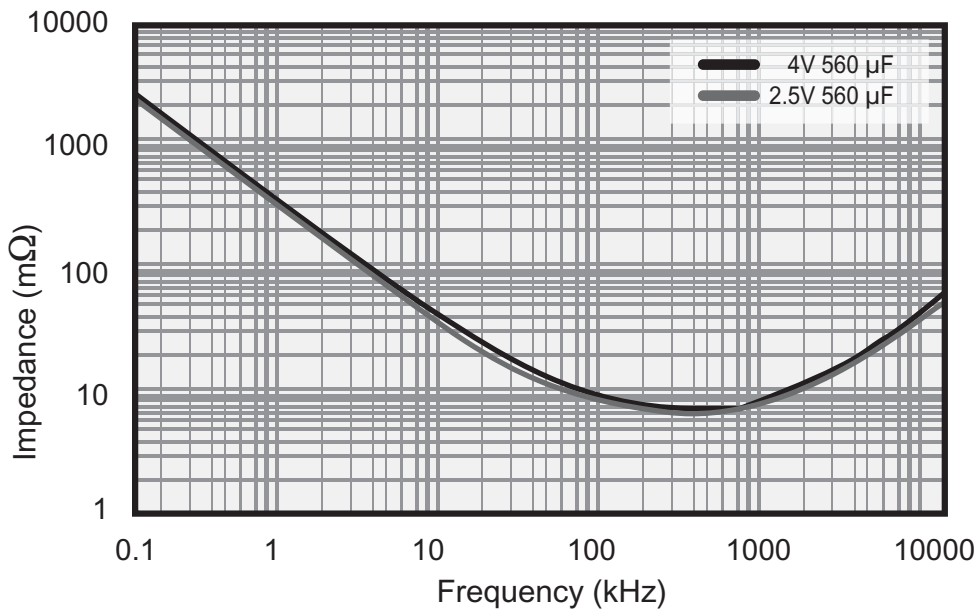
1. Reliability Presumption of Life

$$L_x = L_o \times 10^{\frac{T_o - T_x}{20}}$$

- L<sub>x</sub> : Life expectance (Hours) in actual use ( T<sub>x</sub>)
- L<sub>o</sub> : Guaranteed (Hours) at maximum operating temperature ( T<sub>o</sub>)
- T<sub>o</sub> : Maximum operating temperature (°C)
- T<sub>x</sub> : Temperature in actual use (Ambient temperature of X-CON) (°C)

Owing to the excellent heat-proof characteristics of conductive polymer, the estimated life expectancy can be calculated without consideration of self-heating under application of the ripple current.

2. General Frequency Characteristics Of X-CON



\*For the characteristics of other capacitance or voltage, please contact our sales offices or agents

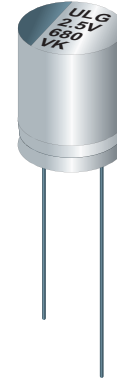
3. Part Number System

<div style="display: flex; justify-content: space-between;"> <span>1 2 3</span> <span>4 5 6</span> </div> <div style="display: flex; justify-content: space-between;"> <span>U L R</span> <span>5 6 7</span> </div> <p>Series          Capacitance</p>			<div style="display: flex; justify-content: center;"> <span>7</span> </div> <p>M</p> <p>Tolerance</p>		<div style="display: flex; justify-content: space-between;"> <span>8 9</span> </div> <div style="display: flex; justify-content: space-between;"> <span>0 G</span> </div> <p>Voltage</p>		<div style="display: flex; justify-content: center;"> <span>10</span> </div> <p>F</p> <p>Case Dia</p>		<div style="display: flex; justify-content: space-between;"> <span>11 12</span> </div> <div style="display: flex; justify-content: space-between;"> <span>T 5</span> </div> <p>Case Length</p>		<div style="display: flex; justify-content: space-between;"> <span>13 14</span> </div> <div style="display: flex; justify-content: space-between;"> <span>R R</span> </div> <p>Type</p>	
Series	Cap. (μF)	Code	Tol. (%)	Code	Vol. (V)	Code	Dia. (mm)	Code	Len. (mm)	Code	Feature	Code
ULG	68	686	± 20%	M	2.5	0E	8	F	8.0	80	Bulk	RR
	100	107							10.2	T2		
ULR	150	157	± 10%	K	4	0G	10	G	11.5	A5	Cutting F=3.0mm	CA
	180	187							12	B0		
USR	270	277			6.3	0J			12.5	B5	Taping F=2.5mm	TR
	330	337										
USG	390	397			10	1A					Taping F=3.5mm	TV
	470	477										
UVG	560	567			16	1C					Taping F=5.0mm	TC
	680	687										
UVR	820	827			20	1D					V-chip Type	TR
	1000	108										
	1200	128										
	1500	158										
	2700	278			25	1E						

Conductive Polymer Aluminum Solid Capacitors

Features

- High Ripple Current, Super Low ESR
- Wide Temperature Range
- RoHS Compliant



Applications

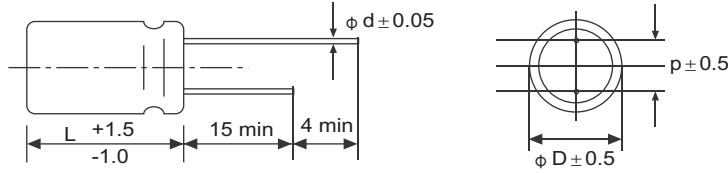
- Suitable For DC-DC Converters, Voltage Regulators, Decoupling Applications For Computer Motherboards, etc.

Specifications

Items	Conditions	Characteristics				
Operating Temperature	-----	-55°C to +105°C				
Rated Working Voltage, WV	-----	2.5VDC to 25VDC				
Nominal Capacitance	120 Hz, +20°C	68μF to 1500μF				
Capacitance Tolerance	120 Hz, +20°C	±20%				
Dissipation Factor, tanδ	120 Hz, +20°C	Value in the Standard Rating Table or less				
Leakage Current, L <sub>c</sub> ※1	+20°C, Rated voltage for 2 minutes,	Value in the Standard Rating Table or less				
ESR	100kHz to 300kHz, +20°C	Value in the Standard Rating Table or less				
Rated Ripple Current	100kHz, +105°C	Value in the Standard Rating Table or less				
Temperature Characteristics, Impedance Ratio	100kHz	At -55°C (Low temperature)		Z/Z <sub>20°C</sub> = 0.75 to 1.25		
		At +105°C (High temperature)		Z/Z <sub>20°C</sub> = 0.75 to 1.25		
Frequency Coefficient for Allowable Ripple Current	-----	Frequency	120Hz ≤ f < 1kHz	1kHz ≤ f < 10kHz	10kHz ≤ f < 100kHz	100kHz ≤ f < 500kHz
		Coefficient	0.05	0.3	0.7	1
Endurance	+105°C, 2000 hours, Rated voltage applied	ΔC/C	Within ±20% of initial measured value			
		tanδ	≤ 150% of initial specified value			
		ESR	≤ 150% of initial specified value			
		L <sub>c</sub> ※1	≤ Initial specified value			
Damp Heat Test (Steady State)	+ 60°C, 90% to 95% RH, 1000 hours, No applied voltage	ΔC/C	Within ±20% of initial measured value			
		tanδ	≤ 150% of initial specified value			
		ESR	≤ 150% of initial specified value			
		L <sub>c</sub> ※1	≤ Initial specified value			
Surge Voltage Test	At normal temperature, charge at surge voltage for 30 sec. and discharge via a 1kΩ protective resistor for 330 sec. Repeat for 1000 cycles.	ΔC/C	Within ±20% of initial measured value			
		tanδ	≤ 150% of initial specified value			
		ESR	≤ 150% of initial specified value			
		L <sub>c</sub> ※1	≤ Initial specified value			
Other	JIS-C-5101-4					

※1 -If any doubt arises, measure the current after applying rated voltage for 2 hours at +105°C. (Voltage Treatment)

Dimensions



(Unit:mm)

$\phi D \times L$	8 x 11.5	10 x 12.5
$P \pm 0.5$	3.5	5.0
$\phi d$	0.6	0.6

Standard Rating Table

WV (VDC)	SV (VDC)	Capacitance ( $\mu F$ )	Case size		Specifications			
			Diameter (mm)	Length (mm)	$\tan\delta$	$L_c$ ( $\mu A$ ) ※2	ESR (m $\Omega$ ) ※3	Rated Ripple Current (mA) 100kHz, 105°C
2.5	2.8	680	8	11.5	0.12	340.0	10	5230
2.5	2.8	1500	10	12.5	0.12	750.0	8	5500
4.0	4.6	560	8	11.5	0.12	448.0	10	5230
4.0	4.6	820	10	12.5	0.12	656.0	8	5500
6.3	7.2	390	8	11.5	0.12	491.4	12	4770
6.3	7.2	680	10	12.5	0.12	856.8	10	5500
10	11.5	270	8	11.5	0.12	540.0	14	4420
10	11.5	470	10	12.5	0.12	940.0	12	5300
16	18.4	180	8	11.5	0.12	576.0	16	4360
16	18.4	330	10	12.5	0.12	1056.0	14	5050
20	23.0	100	8	11.5	0.12	400.0	24	3320
20	23.0	150	10	12.5	0.12	600.0	20	4320
25	28.7	68	8	11.5	0.12	340.0	24	3320
25	28.7	100	10	12.5	0.12	500.0	20	4320

※2 -Leakage current (max): After 2 minutes, 20°C

※3 -100kHz to 300kHz, 20°C

\*Specifications are subject to changes without notice. For further information, please contact our sales offices or agents



Conductive Polymer Aluminum Solid Capacitors

Features

- High Ripple Current, Super Low ESR
- Wide Temperature Range
- RoHS Compliant



Applications

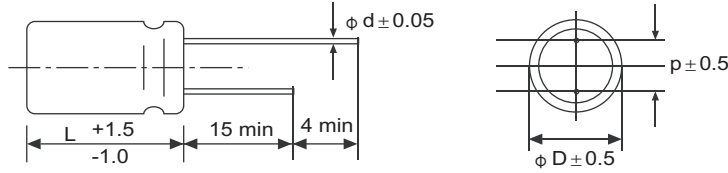
- Suitable For DC-DC Converters, Voltage Regulators, Decoupling Applications For Computer Motherboards, etc.

Specifications

Items	Conditions	Characteristics				
Operating Temperature	-----	-55°C to +105°C				
Rated Working Voltage, WV	-----	2.5VDC to 25VDC				
Nominal Capacitance	120 Hz, +20°C	68µF to 1500µF				
Capacitance Tolerance	120 Hz, +20°C	±20%				
Dissipation Factor, tanδ	120 Hz, +20°C	Value in the Standard Rating Table or less				
Leakage Current, L <sub>c</sub> ※1	+20°C, Rated voltage for 2 minutes,	Value in the Standard Rating Table or less				
ESR	100kHz to 300kHz, +20°C	Value in the Standard Rating Table or less				
Rated Ripple Current	100kHz, +105°C	Value in the Standard Rating Table or less				
Temperature Characteristics, Impedance Ratio	100kHz	At -55°C (Low temperature)		Z/Z <sub>20°C</sub> = 0.75 to 1.25		
		At +105°C (High temperature)		Z/Z <sub>20°C</sub> = 0.75 to 1.25		
Frequency Coefficient for Allowable Ripple Current	-----	Frequency	120Hz≤ f<1kHz	1kHz≤ f<10kHz	10kHz≤ f<100kHz	100kHz≤ f<500kHz
		Coefficient	0.05	0.3	0.7	1
Endurance	+105°C, 2000 hours, Rated voltage applied	ΔC/C	Within ±20% of initial measured value			
		tanδ	≤150% of initial specified value			
		ESR	≤150% of initial specified value			
		L <sub>c</sub> ※1	≤Initial specified value			
Damp Heat Test (Steady State)	+ 60°C, 90% to 95% RH, 1000 hours, No applied voltage	ΔC/C	Within ±20% of initial measured value			
		tanδ	≤150% of initial specified value			
		ESR	≤150% of initial specified value			
		L <sub>c</sub> ※1	≤Initial specified value			
Surge Voltage Test	At normal temperature, charge at surge voltage for 30 sec. and discharge via a 1kΩ protective resistor for 330 sec. Repeat for 1000 cycles.	ΔC/C	Within ±20% of initial measured value			
		tanδ	≤150% of initial specified value			
		ESR	≤150% of initial specified value			
		L <sub>c</sub> ※1	≤Initial specified value			
Other	JIS-C-5101-4					

※1 -If any doubt arises, measure the current after applying rated voltage for 2 hours at +105°C. (Voltage Treatment)

Dimensions



(Unit:mm)

$\phi D \times L$	8 x 11.5	10 x 12.5
$P \pm 0.5$	3.5	5.0
$\phi d$	0.6	0.6

Standard Rating Table

WV (VDC)	SV (VDC)	Capacitance ( $\mu F$ )	Case size		Specifications			
			Diameter (mm)	Length (mm)	$\tan\delta$	$L_c$ ( $\mu A$ ) ※2	ESR (m $\Omega$ ) ※3	Rated Ripple Current (mA) 100kHz, 105°C
2.5	2.8	680	8	11.5	0.12	340.0	10	5230
2.5	2.8	1500	10	12.5	0.12	750.0	8	5500
4.0	4.6	560	8	11.5	0.12	448.0	10	5230
4.0	4.6	820	10	12.5	0.12	656.0	8	5500
6.3	7.2	390	8	11.5	0.12	491.4	12	4770
6.3	7.2	680	10	12.5	0.12	856.8	10	5500
10	11.5	270	8	11.5	0.12	540.0	14	4420
10	11.5	470	10	12.5	0.12	940.0	12	5300
16	18.4	180	8	11.5	0.12	576.0	16	4360
16	18.4	330	10	12.5	0.12	1056.0	14	5050
20	23.0	100	8	11.5	0.12	400.0	24	3320
20	23.0	150	10	12.5	0.12	600.0	20	4320
25	28.7	68	8	11.5	0.12	340.0	24	3320
25	28.7	100	10	12.5	0.12	500.0	20	4320

※2 -Leakage current (max): After 2 minutes, 20°C

※3 -100kHz to 300kHz, 20°C

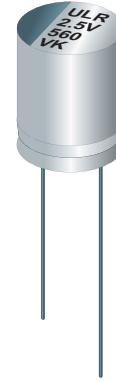
\*Specifications are subject to changes without notice. For further information, please contact our sales offices or agents



Conductive Polymer Aluminum Solid Capacitors

Features

- Higher Ripple Current, Lower ESR Than ULG
- Wide Temperature Range
- RoHS Compliant



Applications

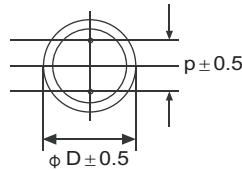
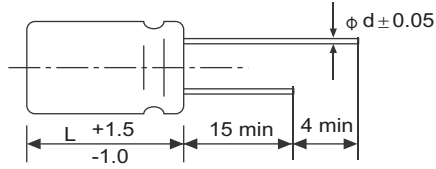
- Suitable For DC-DC Converters, Voltage Regulators, Decoupling Applications For Computer Motherboards, etc.

Specifications

Items	Conditions	Characteristics				
Operating Temperature	-----	-55°C to +105°C				
Rated Working Voltage, WV	-----	2.5VDC to 16VDC				
Nominal Capacitance	120 Hz, +20°C	330μF to 2700μF				
Capacitance Tolerance	120 Hz, +20°C	±20%				
Dissipation Factor, tanδ	120 Hz, +20°C	Value in the Standard Rating Table or less				
Leakage Current, L <sub>c</sub> ※1	+20°C, Rated voltage for 2 minutes,	Value in the Standard Rating Table or less				
ESR	100kHz to 300kHz, +20°C	Value in the Standard Rating Table or less				
Rated Ripple Current	100kHz, +105°C	Value in the Standard Rating Table or less				
Temperature Characteristics, Impedance Ratio	100kHz	At -55°C (Low temperature)		Z/Z <sub>20°C</sub> = 0.75 to 1.25		
		At +105°C (High temperature)		Z/Z <sub>20°C</sub> = 0.75 to 1.25		
Frequency Coefficient for Allowable Ripple Current	-----	Frequency	120Hz ≤ f < 1kHz	1kHz ≤ f < 10kHz	10kHz ≤ f < 100kHz	100kHz ≤ f < 500kHz
		Coefficient	0.05	0.3	0.7	1
Endurance	+105°C, 2000 hours, Rated voltage applied	ΔC/C	Within ±20% of initial measured value			
		tanδ	≤ 150% of initial specified value			
		ESR	≤ 150% of initial specified value			
		L <sub>c</sub> ※1	≤ Initial specified value			
Damp Heat Test (Steady State)	+ 60°C, 90% to 95% RH, 1000 hours, No applied voltage	ΔC/C	Within ±20% of initial measured value			
		tanδ	≤ 150% of initial specified value			
		ESR	≤ 150% of initial specified value			
		L <sub>c</sub> ※1	≤ Initial specified value			
Surge Voltage Test	At normal temperature, charge at surge voltage for 30 sec. and discharge via a 1kΩ protective resistor for 330 sec. Repeat for 1000 cycles.	ΔC/C	Within ±20% of initial measured value			
		tanδ	≤ 150% of initial specified value			
		ESR	≤ 150% of initial specified value			
		L <sub>c</sub> ※1	≤ Initial specified value			
Other	JIS-C-5101-4					

※1 -If any doubt arises, measure the current after applying rated voltage for 2 hours at +105°C. (Voltage Treatment)

Dimensions



(Unit:mm)

$\Phi D \times L$	8 x 8	8 x 11.5	10 x 12.5
$F \pm 0.5$	3.5	3.5	5.0
$\Phi d \pm 0.05$	0.6	0.6	0.6

Standard Rating Table

WV (VDC)	SV (VDC)	Capacitance ( $\mu F$ )	Case size		Specifications			
			Diameter (mm)	Length (mm)	$\tan\delta$	$L_c$ ( $\mu A$ ) ※2	ESR (m $\Omega$ ) ※3	Rated Ripple Current (mA) 100kHz, 105°C
2.5	2.8	560	8	8.0	0.10	280	7	6100
2.5	2.8	820	8	8.0	0.10	410	7	6100
2.5	2.8	820	8	11.5	0.10	410	7	6100
2.5	2.8	1000	8	11.5	0.10	500	7	6100
2.5	2.8	2700	10	12.5	0.10	1350	8	5560
4.0	4.6	560	8	8.0	0.10	448	7	6100
4.0	4.6	680	8	11.5	0.10	544	7	6100
4.0	4.6	1000	10	12.5	0.10	800	6	6640
6.3	7.2	470	8	8.0	0.10	592	8	5700
6.3	7.2	820	10	12.5	0.10	1033	7	6640
6.3	7.2	1500	10	12.5	0.10	1890	10	5560
10	11.5	390	8	11.5	0.10	780	9	5650
10	11.5	680	10	12.5	0.10	1360	7	6100
16	18.4	330	10	12.5	0.10	1056	10	6100

※2 -Leakage current (max): After 2 minutes, 20°C

※3 -100kHz to 300kHz, 20°C

\*Specifications are subject to changes without notice. For further information, please contact our sales offices or agents

Conductive Polymer Aluminum Solid Capacitors

Features

- High Ripple Current, Super Low ESR
- Wide Temperature Range
- RoHS Compliant



Applications

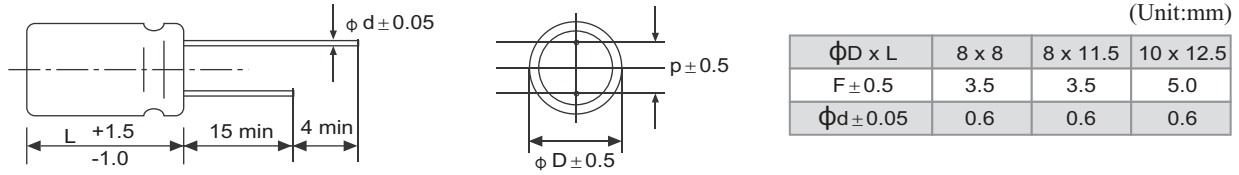
- Suitable For DC-DC Converters, Voltage Regulators, Decoupling Applications For Computer Motherboards, etc.

Specifications

Items	Conditions	Characteristics				
Operating Temperature	-----	-55°C to +105°C				
Rated Working Voltage, WV	-----	2.5VDC to 16VDC				
Nominal Capacitance	120 Hz, +20°C	330µF to 2700µF				
Capacitance Tolerance	120 Hz, +20°C	±20%				
Dissipation Factor, tanδ	120 Hz, +20°C	Value in the Standard Rating Table or less				
Leakage Current, L <sub>c</sub> ※1	+20°C, Rated voltage for 2 minutes,	Value in the Standard Rating Table or less				
ESR	100kHz to 300kHz, +20°C	Value in the Standard Rating Table or less				
Rated Ripple Current	100kHz, +105°C	Value in the Standard Rating Table or less				
Temperature Characteristics, Impedance Ratio	100kHz	At -55°C (Low temperature)		Z/Z <sub>20°C</sub> = 0.75 to 1.25		
		At +105°C (High temperature)		Z/Z <sub>20°C</sub> = 0.75 to 1.25		
Frequency Coefficient for Allowable Ripple Current	-----	Frequency	120Hz≤ f<1kHz	1kHz≤ f<10kHz	10kHz≤ f<100kHz	100kHz≤ f<500kHz
		Coefficient	0.05	0.3	0.7	1
Endurance	+105°C, 2000 hours, Rated voltage applied	ΔC/C	Within ±20% of initial measured value			
		tanδ	≤150% of initial specified value			
		ESR	≤150% of initial specified value			
		L <sub>c</sub> ※1	≤Initial specified value			
Damp Heat Test (Steady State)	+ 60°C, 90% to 95% RH, 1000 hours, No applied voltage	ΔC/C	Within ±20% of initial measured value			
		tanδ	≤150% of initial specified value			
		ESR	≤150% of initial specified value			
		L <sub>c</sub> ※1	≤Initial specified value			
Surge Voltage Test	At normal temperature, charge at surge voltage for 30 sec. and discharge via a 1kΩ protective resistor for 330 sec. Repeat for 1000 cycles.	ΔC/C	Within ±20% of initial measured value			
		tanδ	≤150% of initial specified value			
		ESR	≤150% of initial specified value			
		L <sub>c</sub> ※1	≤Initial specified value			
Other	JIS-C-5101-4					

※1 -If any doubt arises, measure the current after applying rated voltage for 2 hours at +105°C. (Voltage Treatment)

Dimensions



Standard Rating Table

WV (VDC)	SV (VDC)	Capacitance ( $\mu F$ )	Case size		Specifications			
			Diameter (mm)	Length (mm)	$\tan \delta$	$L_c$ ( $\mu A$ ) ※2	ESR (m $\Omega$ ) ※3	Rated Ripple Current (mA) 100kHz, 105°C
2.5	2.8	560	8	8.0	0.10	280	7	6100
2.5	2.8	820	8	8.0	0.10	410	7	6100
2.5	2.8	820	8	11.5	0.10	410	7	6100
2.5	2.8	1000	8	11.5	0.10	500	7	6100
2.5	2.8	2700	10	12.5	0.10	1350	8	5560
4.0	4.6	560	8	8.0	0.10	448	7	6100
4.0	4.6	680	8	11.5	0.10	544	7	6100
4.0	4.6	1000	10	12.5	0.10	800	6	6640
6.3	7.2	470	8	8.0	0.10	592	8	5700
6.3	7.2	820	10	12.5	0.10	1033	7	6640
6.3	7.2	1500	10	12.5	0.10	1890	10	5560
10	11.5	390	8	11.5	0.10	780	9	5650
10	11.5	680	10	12.5	0.10	1360	7	6100
16	18.4	330	10	12.5	0.10	1056	10	6100

※2 -Leakage current (max): After 2 minutes, 20°C

※3 -100kHz to 300kHz, 20°C

\*Specifications are subject to changes without notice. For further information, please contact our sales offices or agents

Conductive Polymer Aluminum Solid Capacitors

Features

- Standard SMD Type Product
- Support Lead Free Reflow
- RoHS Compliant



Applications

- Use For DC-DC converters, Voltage Regulators And Decoupling Applications, Computer Motherboards, etc.

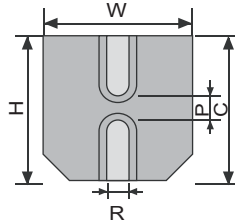
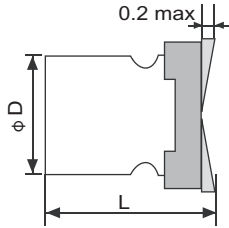
Specifications

Items	Conditions	Characteristics				
Operating Temperature	-----	-55°C to +105°C				
Rated Working Voltage, WV	-----	2.5VDC to 20VDC				
Surge Voltage, SV	Normal temperature	SV = WV x 1.15 VDC				
Nominal Capacitance	120 Hz, +20°C	100µF to 1500µF				
Capacitance Tolerance	120 Hz, +20°C	±20%				
Dissipation Factor, tanδ	120 Hz, +20°C	Value in the Standard Rating Table or less				
Leakage Current, L <sub>C</sub> ※1	+20°C, Rated voltage for 2 minutes,	Value in the Standard Rating Table or less				
ESR	100kHz to 300kHz, +20°C	Value in the Standard Rating Table or less				
Rated Ripple Current	100kHz, +105°C	Value in the Standard Rating Table or less				
Temperature Characteristics, Impedance Ratio	100kHz	At -55°C (Low temperature)		Z/Z <sub>20°C</sub> = 0.75 to 1.25		
		At +105°C (High temperature)		Z/Z <sub>20°C</sub> = 0.75 to 1.25		
Frequency Coefficient for Allowable Ripple Current	-----	Frequency	120Hz≤ f<1kHz	1kHz≤ f<10kHz	10kHz≤ f<100kHz	100kHz≤ f<500kHz
		Coefficient	0.05	0.3	0.7	1
Endurance	+105°C, 2000 hours, Rated voltage applied	△C/C	Within ±20% of initial measured value			
		tanδ	≤150% of initial specified value			
		ESR	≤150% of initial specified value			
		L <sub>C</sub> ※1	≤Initial specified value			
Damp Heat Test (Steady State)	+ 60°C, 90% to 95% RH, 1000 hours, No applied voltage	△C/C	Within ±20% of initial measured value			
		tanδ	≤150% of initial specified value			
		ESR	≤150% of initial specified value			
		L <sub>C</sub> ※1	≤Initial specified value			
Resistance to Soldering Heat ※2	230°C, 75 sec.	△C/C	Within ±20% of initial measured value			
		tanδ	≤150% of initial specified value			
		ESR	≤150% of initial specified value			
		L <sub>C</sub> ※1	≤Initial specified value			
Other	JIS-C-5101-18					

※1 -If any doubt arises, measure the current after applying rated voltage for 2 hours at +105°C. (Voltage Treatment)

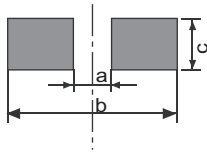
※2 -Refer to Page 19 for the details of reflow soldering conditions.

Dimensions



(Unit:mm)

φD x L	8.0 x 10.2	8.0 x 12	10 x 12.5
W±0.2	8.3	8.3	10.3
H±0.2	8.3	8.3	10.3
C±0.2	9.0	9.0	11.0
R	0.8~1.1	0.8~1.1	0.8~1.1
P±0.2	3.2	3.2	4.6
a	2.8	2.8	4.3
b	11.1	11.1	13.1
c	1.9	1.9	1.9



■ Recommended land pattern dimension of PWB

Standard Rating Table

WV (VDC)	SV (VDC)	Capacitance (μF)	Case size		Specifications			
			Diameter (mm)	Length (mm)	tanδ	L <sub>C</sub> (μA) ※3	ESR (mΩ) ※4	Rated Ripple Current (mA) 100kHz, 105°C
2.5	2.8	560	8	10.2	0.15	280	15	4210
2.5	2.8	680	8.0	12.0	0.15	340	13	4520
2.5	2.8	1500	10.0	12.5	0.18	750	12	5440
4.0	4.6	560	8.0	12.0	0.15	448	13	4520
4.0	4.6	1200	10.0	12.5	0.18	960	12	5440
6.3	7.2	470	8.0	12.0	0.15	592	15	4210
6.3	7.2	820	10.0	12.5	0.15	775	12	5440
10.0	11.5	330	8.0	12.0	0.15	660	17	3950
10.0	11.5	560	10.0	12.5	0.15	840	13	5230
16.0	18.4	180	8.0	12.0	0.15	576	20	3640
16.0	18.4	330	10.0	12.5	0.15	792	16	4720
20.0	23.0	100	8.0	12.0	0.15	400	24	3320
20.0	23.0	150	10.0	12.5	0.15	600	20	4320

※3 -Leakage current (max): After 2 minutes, 20°C

※4 -100kHz to 300kHz, 20°C

\*Specifications are subject to changes without notice. For further information, please contact our sales offices or agents

Conductive Polymer Aluminum Solid Capacitors

Features

- Surface Mounted Type Product With Large Capacitance And Low ESR.
- Support Lead Free Reflow
- RoHS Compliant



Applications

- Use for DC-DC Converters, Voltage Regulators, Decoupling Application For Computer Motherboard And High End Graphic Card, etc.

Specifications

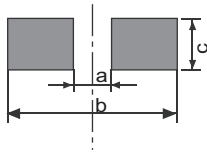
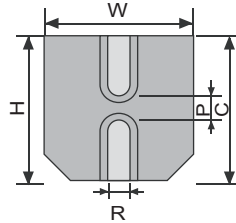
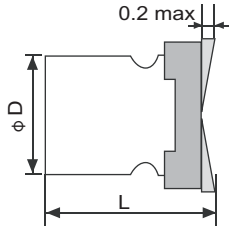
Items	Conditions	Characteristics				
Operating Temperature	-----	-55°C to +105°C				
Rated Working Voltage, WV	-----	2.5VDC to 20VDC				
Surge Voltage, SV	Normal temperature	SV = WV x 1.15 VDC				
Nominal Capacitance	120 Hz, +20°C	100µF to 1500µF				
Capacitance Tolerance	120 Hz, +20°C	±20%				
Dissipation Factor, tanδ	120 Hz, +20°C	Value in the Standard Rating Table or less				
Leakage Current, L <sub>C</sub> ※1	+20°C, Rated voltage for 2 minutes,	Value in the Standard Rating Table or less				
ESR	100kHz to 300kHz, +20°C	Value in the Standard Rating Table or less				
Rated Ripple Current	100kHz, +105°C	Value in the Standard Rating Table or less				
Temperature Characteristics, Impedance Ratio	100kHz	At -55°C (Low temperature)		Z/Z <sub>20°C</sub> = 0.75 to 1.25		
		At +105°C (High temperature)		Z/Z <sub>20°C</sub> = 0.75 to 1.25		
Frequency Coefficient for Allowable Ripple Current	-----	Frequency	120Hz≤ f<1kHz	1kHz≤ f<10kHz	10kHz≤ f<100kHz	100kHz≤ f<500kHz
		Coefficient	0.05	0.3	0.7	1
Endurance	+105°C, 2000 hours, Rated voltage applied	△C/C	Within ±20% of initial measured value			
		tanδ	≤150% of initial specified value			
		ESR	≤150% of initial specified value			
		L <sub>C</sub> ※1	≤Initial specified value			
Damp Heat Test (Steady State)	+ 60°C, 90% to 95% RH, 1000 hours, No applied voltage	△C/C	Within ±20% of initial measured value			
		tanδ	≤150% of initial specified value			
		ESR	≤150% of initial specified value			
		L <sub>C</sub> ※1	≤Initial specified value			
Resistance to Soldering Heat ※2	230°C, 75 sec.	△C/C	Within ±20% of initial measured value			
		tanδ	≤150% of initial specified value			
		ESR	≤150% of initial specified value			
		L <sub>C</sub> ※1	≤Initial specified value			
Other	JIS-C-5101-18					

※1 -If any doubt arises, measure the current after applying rated voltage for 2 hours at +105°C. (Voltage Treatment)

※2 -Refer to Page 19 for the details of reflow soldering conditions.



Dimensions



■ Recommended land pattern dimension of PWB

(Unit:mm)

φD x L	8.0 x 10.2	8.0 x 12	10 x 12.5
W±0.2	8.3	8.3	10.3
H±0.2	8.3	8.3	10.3
C±0.2	9.0	9.0	11.0
R	0.8~1.1	0.8~1.1	0.8~1.1
P±0.2	3.2	3.2	4.6
a	2.8	2.8	4.3
b	11.1	11.1	13.1
c	1.9	1.9	1.9

Standard Rating Table

WV (VDC)	SV (VDC)	Capacitance (μF)	Case size		Specifications			
			Diameter (mm)	Length (mm)	tanδ	L <sub>C</sub> (μA) ※3	ESR (mΩ) ※4	Rated Ripple Current (mA) 100kHz, 105°C
2.5	2.8	560	8	10.2	0.12	280	12	4680
2.5	2.8	680	8.0	12.0	0.12	340	10	5020
2.5	2.8	1500	10.0	12.5	0.12	750	10	6040
4.0	4.6	560	8.0	12.0	0.12	448	10	5020
4.0	4.6	1200	10.0	12.5	0.12	960	10	6040
6.3	7.2	470	8.0	12.0	0.12	592	12	4780
6.3	7.2	820	10.0	12.5	0.12	1033	10	6040
10.0	11.5	330	8.0	12.0	0.12	660	14	4390
10.0	11.5	560	10.0	12.5	0.12	1120	11	5810
16.0	18.4	180	8.0	12.0	0.12	576	16	4040
16.0	18.4	330	10.0	12.5	0.12	1056	13	5240
20.0	23.0	100	8.0	12.0	0.12	400	19	3690
20.0	23.0	150	10.0	12.5	0.12	600	16	4800

※3 -Leakage current (max): After 2 minutes, 20°C

※4 -100kHz to 300kHz, 20°C

\*Specifications are subject to changes without notice. For further information, please contact our sales offices or agents

**X-CON should be used in compliance with the following guidelines.**

## **1. Circuit Design**

### 1.1 Prohibited Circuits

Do not use the capacitors in the following circuits.

- 1) Time constant circuits
- 2) Coupling circuits
- 3) Circuits which are greatly affected by leakage current
- 4) High impedance voltage retention circuits.

### 1.2 Voltage Applied

The applied voltage is equal to the voltage value including the peak value of the transitional instantaneous voltage and that of ripple voltage, not just steady line voltage.

- 1) Do not apply over-rated voltage or reverse voltage as it may lead to the increase in leakage current and short circuit
- 2) When DC voltage is low, a negative ripple voltage peak value must not become a reverse voltage that exceeds 10% of the rated voltage.

### 1.3 Restriction on Sudden Charge or Discharge

Sudden charge and discharge may result in short circuits or larger leakage current. Therefore, protection circuits are suggested to build in when one of the following conditions are anticipated.

- 1) The rush current exceeding 10A
- 2) The rush current exceeding 10 times of rated ripple current of X-CON.  
A protection resistor (1K $\Omega$ ) must be inserted to the circuit during the charge and discharge when measuring the leakage current.

### 1.4 Ripple current

Use the capacitors within the rated ripple current. When excessive ripple current is applied to the capacitor, it may causes the increase in leakage current and short circuits due to self- heating.

### 1.5 Leakage Current

There is a risk of leakage current increasing even if the following usage environments are within the suggested range. Owing to the self-correction mechanism, the leakage current returns to a small vaule in most cases after the application of voltage

- 1) After soldering or re-flow
- 2) High temperature under no loading
- 3) High temperature / High humidity under no loading
- 4) Sudden temperature changes

### 1.6 Capacitor Insulation

- 1) Insulation of the marked sleeve is not guaranteed. Be aware that the space between the case and the negative electrode terminal is not insulated and has some resistance.
- 2) Completely separate the case, negative lead terminal, positive lead terminal and PCB patterns with each other.

### 1.7 Precautions for using capacitors

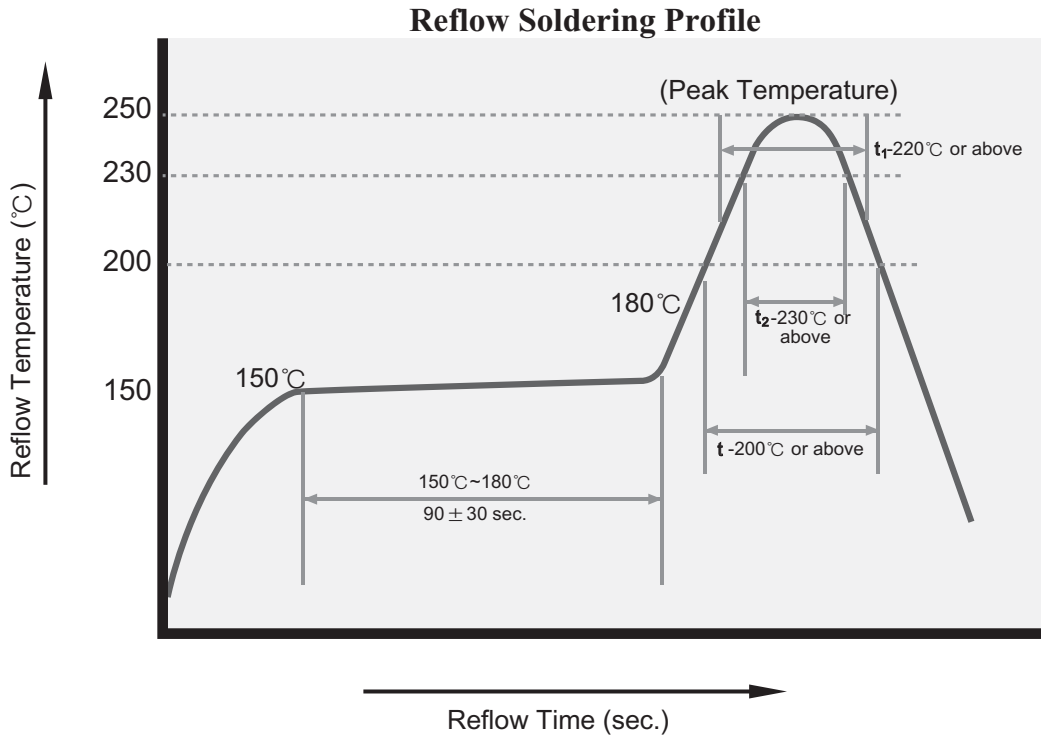
X-CON capacitors should not be used in the following environments.

- 1) Direct contact with salt water or oil can directly fall on it.
- 2) Exposed to direct sunlight.
- 3) High temperature owing to heat generating components around the X-CON and on the underside of the PCB
- 4) High Humidity where condensation can form on the surface of the capacitor.
- 5) Direct contact with chemically active gases.
- 6) Acid or alkaline environments.
- 7) High-frequency induction.
- 8) Excessive vibration and shock.

## 2. Mounting Precautions

Phases	Things to be noted	Disposition			
Before mounting	1) Check the marking on the body	Don't use products without marked polar, capacitance and rated voltage			
	2) Check the pitch between lead terminal and PCB	Use X-CON only when the said pitch is matched.			
	3) Find the leakage current increased after long storage	Apply the capacitor with rated voltage in series with 1KΩ resistance for 1 hour at the range between 60 and 70°C.			
	4) Drop to the floor	Don't use			
	5) Handling	Use X-CON with lead terminal and body not subject to any stress.			
	6) Adopt a used X-CON	No re-used			
Mounting	1) Soldering with a soldering iron	Meet the temperature and duration requirements of out-going specification; Not allow any stress during mounting; Don't let the tip of the soldering iron touch X-CON.			
	2) Flow soldering (for radial type)	Don't submerge X-CON body in melted solder; Meet the temperature and duration requirements of out-going specification; Not allow the flux to adhere to anywhere except the lead terminal. The details for flow soldering are as follows:			
			Temperature	Duration	Flow times
		Preheating	≤120°C (ambient temp.)	≤120 sec.	1
	Soldering conditions	≤(260+5)°C	≤(10+1) sec.	≤2	
After mounting	3) Reflow soldering (for SMD type)	Allow for UVR, UVG series (see page 22 for details).			
	1) Handling	Do not tilt, bend, twist X-CON; Do not allow other things touching X-CON.			
	2) Wash the PCB (Suggested cleaning agents ① High quality alcohol-based cleaning fluids such as st-100s,750L,750M; ② Detergents including substitute freon such as AK-225AES and IPA)	Use immersion or ultrasonic waves to clean for a total of less than 5 minutes and adjust the temperature of the agents not higher than 60°C; Observe the contamination of the agents (conductivity, pH, specific gravity, water cleaning and etc.); Dry X-CON in hot air with the air temperature less than the maximum operating temperature.			

### 3. Reflow Soldering Conditions



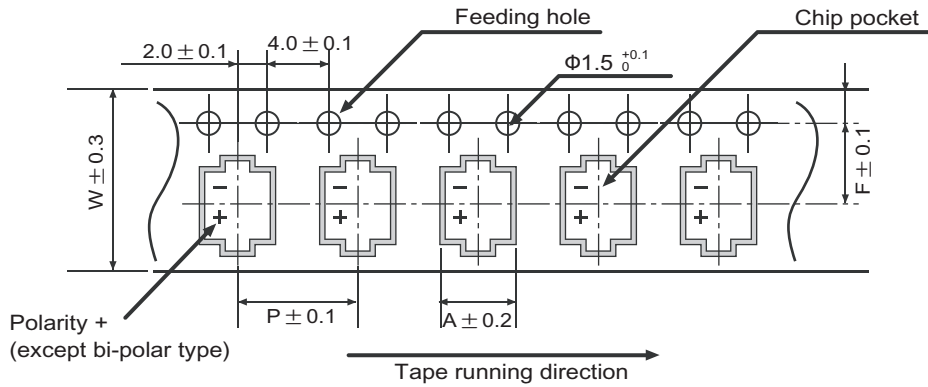
	Stage	Temperature/ Max. Time	
1	Preheat	150°C to 180°C/ 90 ± 30 sec.	
2	Peak Temperature	250°C	260°C
	t -200°C or above	60 sec.	60 sec.
	t <sub>1</sub> -220°C or above	50 sec.	50 sec.
	t <sub>2</sub> -230°C or above	40 sec.	40 sec.
	Reflow Time	Twice or less	Only 1 time

All temperatures are measured on the topside of the Al-can and terminal surface.

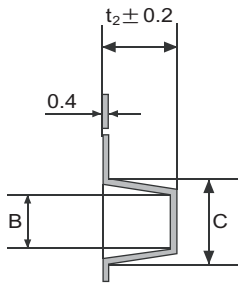
**Attention:**

Reflow soldering may reduce the capacitance of products before or after soldering even if meeting soldering conditions per Recommended Reflow Condition. Soldering considerably deviating from these conditions will cause problems such as a 50% reduction in capacitance, and a considerable increase in leakage current. Thus, the peak temperature at the top of Al-case/Electrode terminals and the duration of the reflow over 200°C should not exceed the specifications.

4. Specifications for SMD Type Packing

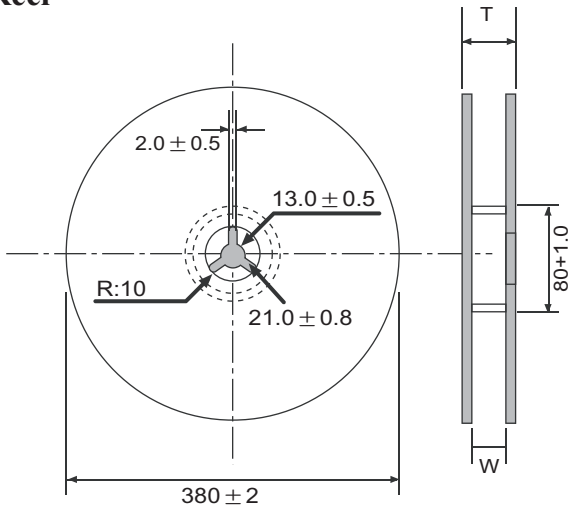


(Unit:mm)

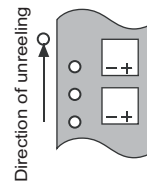


Dimension Size	A	B	C	W	F	E	P	t <sub>2</sub>
φ8 x 10.2	8.6 ±0.2	8.6 ±0.2	12.5 ±0.5	24.0 ±0.3	11.5 ±0.1	1.75 ±0.1	16.0 ±0.1	11.0 ±0.2
φ10 x 10.2	10.7 ±0.2	10.7 ±0.2	14.5 ±0.5	24.0 ±0.3	11.5 ±0.1	1.75 ±0.1	16.0 ±0.1	11.0 ±0.2
φ8 x 12	8.6 ±0.2	8.6 ±0.5	12.5 ±0.2	24.0 ±0.3	11.5 ±0.1	1.75 ±0.1	16.0 ±0.1	11.0 ±0.2
φ10 x 12.5	10.7 ±0.2	10.7 ±0.5	14.5 ±0.2	24.0 ±0.3	11.5 ±0.1	1.75 ±0.1	16.0 ±0.1	13.0 ±0.2

a) Reel



b) Polarity



(Unit:mm)

Size	W	T
φ8 x 10.2	25.0 ± 0.5	29.5 ± 1.0
φ10 x 10.2		
φ8 x 12.0		
φ10 x 12.5		

c) Minimum Packing Quantity

Size	φ8 x 10.2	φ8 x 12	φ10 x 10.2	φ10 x 12.5
pcs./Reel (φ380)	500	500	500	400

## 5. Emergency Procedures

If the capacitor is overheated, the resin case may emit smoke. If this occurs, immediately switch off the unit's main power supply to stop operation. Keep your body away from the capacitor as the temperature may be high enough to cause the capacitor to ignite and burn.

## 6. Disposal and Storage Conditions.

### 6.1 Disposal

Since capacitors are composed of various metals and resins, dispose them as industrial waste.

### 6.2 Storage conditions

- 1) Do not store the X-CONs in those environments with high temperatures and high humidity, or in the location subject to direct sunlight; Store in conditions within 5°C ~35°C and relative humidity below 75%;
- 2) Store the X-CONs in the condition as they are shipped to keep good solderability; SMD types (UVR and UVG series) should be sealed up in specifically designed aluminum laminate bags to avoid deterioration in characteristics and solderability before and after reflows, which results from moisture absorption;
- 3) Store the X-CONs packed in bags after delivery per the table below;

X-CON type	Before unsealing	After unsealing
Radial lead type packed in bags	Must be used within 1 year after delivery (unsealed status)	Must be used within a week (opened status)
Radial lead type packed in taping method	Must be used within 6 months after delivery (unsealed status)	Must be used within a week (opened status)
SMD type	Must be used within 6 months after delivery (unsealed status)	Must be used within a month (opened status)

4) Don't open packed bags until mounting, and use up all products once open. In case of leftovers, pack radial lead types in bags, SMD types and unpackaged ones back into special storage bags (designed aluminum laminate bags for SMD types), and seal up the opening. Put radial lead types with taping in plastic bags as they are put into storage boxes and seal up the opening, too. Regarding leftover storage, please follow the storage instructions as shown in above table;

5) Don't store X-CONs in damp conditions or as stated in Item 1.8;

6) Don't store X-CONs in places filled with toxic gases or susceptible to ozone, ultraviolet ray and radiation.

## 7. Compliance with RoHS Directive

Our company is committed to comply with the European Union Restriction of Hazardous Substance (RoHS) Directive. We hereby guarantee that our products do not contain the following materials exceeding the RoHS Directive

Lead (Pb)	≤ 1000ppm
Mercury (Hg)	≤ 1000ppm
Cadmium (Cd)	≤ 100ppm
Hexavalent chromium, Cr <sup>6+</sup>	≤ 1000ppm
Polybrominated biphenyls (PBB <sub>s</sub> )	≤ 1000ppm
Polybrominated diphenyl ethers (PBDE <sub>s</sub> )	≤ 1000ppm



X-CON Electronics Limited  
Unit C, 19/F Yiko Industrial Building, 10 Ka Yip Street, Chaiwan, Hong Kong  
Tel: (852) 2896 7179  
Fax: (852) 2558 0635  
Email: [sales@samxon.com](mailto:sales@samxon.com)