

SCOPE

This specification is for aluminum solid electrolytic capacitors with organic semiconductor.

APPLICATION STANDARDS

KS C 6421 (W) and KS C 6035, except as specified in this specification.

OPERATION TEMPERATURE RANGE

-55°C ~ +105°C

RATED VOLTAGE, SURGE, CATEGORY VOLTAGE AND REATED TEMPERATURE

Rated voltage (V)	Rated temperature (°C)	Surge (V)	Category voltage (V)
2.5	105	3.3	2.5
4	105	5.2	4
6.3	105	8.2	6.3
10	105	11.5	10.0
16	105	18.4	16.0
20	105	23.0	20.0
25	85	25.0	20.0

The sum of DC voltage and the peak of ripple voltage must not exceed the rated voltage.

SIZES & DIMENSIONS

Construction of UNI-CON

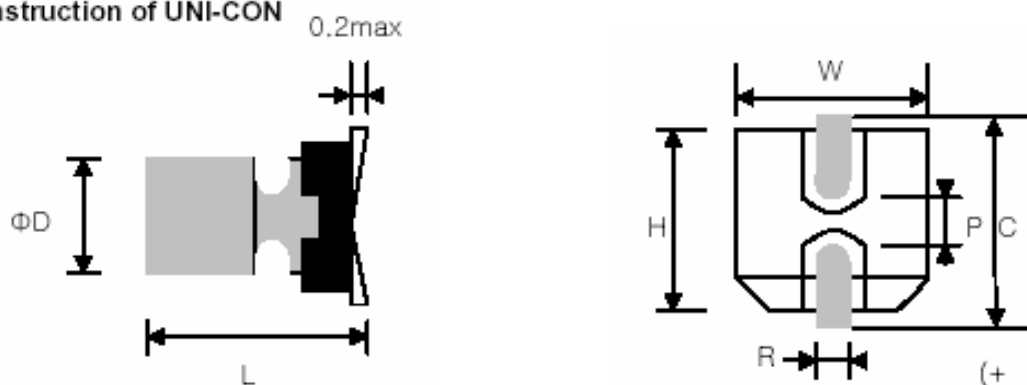


Table 1: (the numbers are in mm)

Size Code	ΦDxL	W±0.2	H±0.2	C±0.2	P±0.2	R
A5	4.0x5.5	4.3	4.3	5.0	1.0	0.5~0.8
B6	5.0x6.0	5.3	5.3	6.0	1.4	0.5~0.8
C6	6.3x6.0	6.6	6.6	7.3	2.1	0.5~0.8
E7	8.0x7.0	8.3	8.3	9.0	3.2	0.5~0.8
F8	10.0x8.0	10.3	10.3	11.0	4.6	0.5~0.8
E12	8.0x12.0	8.3	8.3	9.0	3.2	0.8~1.1
F12	10.0x12.7	10.3	10.3	11.0	4.6	0.8~1.1

Table 2: Body Size vs. Capacitance (in mm) and performance characteristics

Size Code	Part Number	Rated voltage (VDC)	Capacitance (uF)	tan δ (max.)	ESR (100kHz,mΩ)	Leakage Current (uA)	Permissibl Ripple Current (mA rms)	Surge voltage (VDC)
A5	SCL16M3R3	16	3.3	0.07	260	26.4	660	18.4
	SCL10M4R7	10	4.7	0.08	240	23.5	670	11.5
	SCL10M6R8	10	6.8	0.09	240	34.0	670	11.5
	SCL10M100	10	10	0.10	220	50.0	700	11.5
	SCL10M150	10	15	0.10	200	75.0	740	11.5
	SCL6R3M220	6.3	22	0.12	200	69.3	740	8.2
	SCL04M330	4	33	0.15	200	66.0	740	5.2
B6	SCL20M100	20	10	0.10	120	100	1,020	23.0
	SCL16M150	16	15	0.10	120	120	1,020	18.4
	SCL16M220	16	22	0.10	90	176	1,060	18.4
	SCL10M330	10	33	0.12	70	165	1,100	11.5
	SCL6R3M470	6.3	47	0.12	70	148	1,100	8.2
	SCL04M390	4	39	0.12	70	78	1,100	5.2
	SCL04M680	4	68	0.12	60	136	1,400	5.2
C6	SCL25M6R8	25	6.8	0.10	80	85	1,200	25.0
	SCL20M220	20	22	0.10	60	88	1,450	23.0
	SCL20M270	20	27	0.10	60	108	1,450	23.0
	SCL16M390	16	39	0.10	50	125	1,620	18.4
	SCL10M470	10	47	0.12	50	94	1,620	11.5
	SCL10M560	10	56	0.12	45	112	1,700	11.5

Size Code	Part Number	Rated voltage (VDC)	Capacitance (uF)	tan δ (max.)	ESR (100kHz,m Ω)	Leakage Current (uA)	Permissibl Ripple Current (mA rms)	Surge voltage (VDC)
	SCL6R3M820	6.3	82	0.12	50	103	1,700	8.2
	SCL6R3M101	6.3	100	0.12	40	126	1,810	8.2
	SCL04M151X	4	150	0.12	40	120	1,810	5.2
E7	SCL15M100	25	10	0.10	60	125	1,500	25.0
	SCL20M330	20	33	0.12	45	132	1,890	23.0
	SCL20M470	20	47	0.12	45	188	1,890	23.0
	SCL6R3M121	6.3	120	0.12	40	153	2,220	8.2
	SCL16M560	16	56	0.12	45	179	1,890	18.4
	SCL16M820	16	82	0.12	40	262	2,120	18.4
	SCL10M121	10	120	0.12	35	240	2,560	11.5
	SCL10M151X	10	150	0.12	35	300	2,560	11.5
	SCL6R3M221X	6.3	220	0.12	35	277	2,560	8.2
	SCL04M151	4	150	0.12	35	120	2,560	5.2
	SCL04M331	4	330	0.12	35	264	2,560	5.2
F8	SCL25M220	25	22	0.10	50	275	2,000	25.0
	SCL20M560	20	56	0.12	40	224	2,400	23.0
	SCL20M680	20	68	0.12	40	272	2,400	23.0
	SCL16M101	16	100	0.12	35	320	2,670	18.4
	SCL16M151	16	150	0.12	30	480	3,020	18.4
	SCL16M181X	16	180	0.12	30	576	3,020	18.4
	SCL10M151	10	150	0.12	30	300	3,020	11.5
	SCL10M271	10	270	0.12	25	540	3,700	11.5
	SCL10M331X	10	330	0.12	25	660	3,700	11.5
	SCL6R3M221	6.3	220	0.12	25	277	3,700	8.2
	SCL6R3M331	6.3	330	0.12	25	416	3,700	8.2
	SCL6R3M471X	6.3	470	0.12	25	592	3,700	8.2
	SCL04M681	4	680	0.12	25	544	3,700	5.2
E12	SCL25M330	25	33	0.12	30	413	2,980	25.0
	SCL20M101	20	100	0.15	24	400	3,320	23.0

USA

CHINA

TAIWAN

Size Code	Part Number	Rated voltage (VDC)	Capacitance (uF)	tan δ (max.)	ESR (100kHz,m Ω)	Leakage Current (uA)	Permissibl Ripple Current (mA rms)	Surge voltage (VDC)
	SCL16M181	16	180	0.15	20	576	3,640	18.4
	SCL10M331	10	330	0.15	17	660	3,950	11.5
	SCL6R3M471	6.3	470	0.15	15	592	4,210	8.2
	SCL04M561	4	560	0.15	13	448	4,520	5.2
	SCL2R5M681	2.5	680	0.15	13	340	4,520	3.3
F12	SCL25M560	25	56	0.12	28	700	3,800	25.0
	SCL20M151	20	150	0.15	20	600	4,320	23.0
	SCL16M331	16	330	0.15	16	792	4,720	18.4
	SCL10M561	10	560	0.15	13	840	5,230	11.5
	SCL6R3M821	6.3	820	0.15	12	775	5,440	8.2
	SCL04M122	4	1200	0.18	12	960	5,440	5.2
	SCL2R5M152	2.5	1500	0.18	12	750	5,440	3.3
	SCL2R5M272	2.5	2700	0.15	12	1350	5,070	3.3

Size code	a	b	c
A5	1.0	6.2	1.6
B6	1.4	7.4	1.6
C6	2.1	9.1	1.6
E7	2.8	11.1	1.9
F8	4.3	13.1	1.9
E12	2.8	11.1	1.9
F12	4.3	13.1	1.9

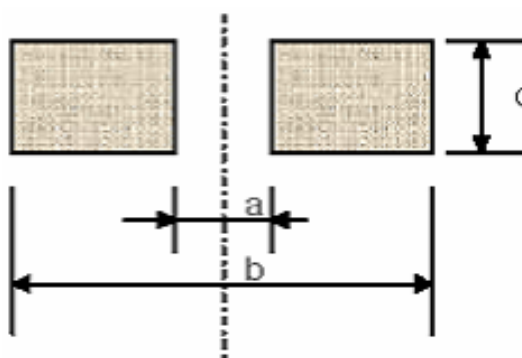


Table 3: Recommended Land Pattern

PART NUMBERING SYSTEM

Skywell SMD OP-Con Electrolytic capacitors can be ordered by the part numbers as below:

For example: SCL04M122

SCL	—	04	M	122
Type	Option Code	Voltage	Tolerance	Capacitance
SMD Type	**	04=4.0V 2R5=2.5V 6R3=6.3V 10=10V 16=16V 20=20V 25=25V	M=±20%	3-digit code here is 1200uF

** : High temperature reflow profile option code. Ex: “H” can meet single pass reflow soldering temperatures at durations of 230oC for 60 seconds.

PERFORMANCE CHARACTERISTICS

Test Environmental Conditions:

Ambient Temperature: 20±2°C / Relative Humidity:60~70%/ Air Pressure: 86~106kPa

ITEM	TEST CONDITIONS	SPECIFICATION
1. Capacitance (Tolerance)	Measuring Frequency: 120Hz Measuring Voltage: 0.5V rms or less DC Bias Voltage: +1.5~2.0Vdc Measuring Circuit: Equivalent Series Circuit	Refer to Table 2 (M: ±20%)
2. Tan δ	Measuring shall be made under the same conditions as Those given for the measurement of capacitance.	Refer to Table 2
3. ESR	At 20°C, 100~300KHz	Refer to Table 2
4. Maximum Permissible Ripple Current	Temperature: 105°C Ripple: rms value of 100KHz sine wave AC (the sum of DC voltage & peak voltage shall not exceed the rated voltage).	Refer to Table 2
5. Leakage Current	The rated voltage shall be applied across the capacitors Through a 1000 ±10Ω protective resistor. The leakage current shall be measured after an electrification period of 2 minutes.	Refer to Table 2

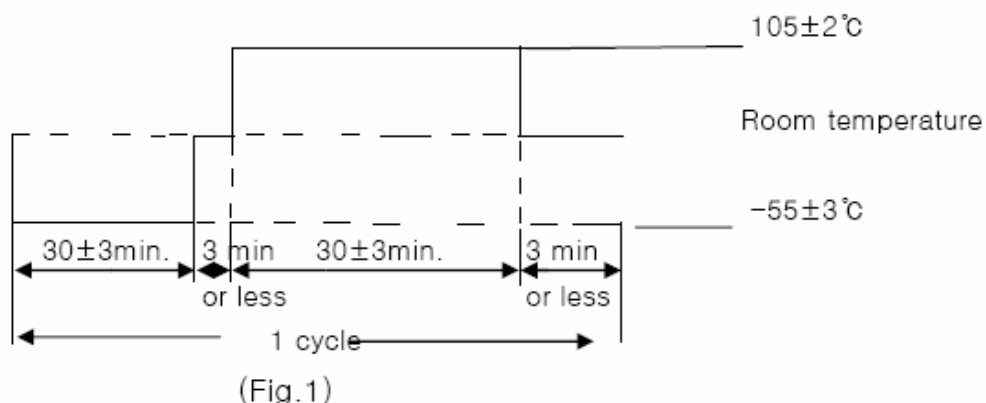
ITEM	TEST CONDITIONS	SPECIFICATION
6. Surge Voltage	Applied Voltage: see table 1. Temperature: 15 ~ 35 °C Duration of Charge: 30±5 seconds Duration of discharge: 5 minutes & 30 seconds Cycles times: 1000 times	No visible damage Leakage Current ≤ initial specified value. Capacitance Change: within 15% of initial value. Tan δ ≤ initial specified value.
7. High & Low Temperature Characteristics	Step	* Step 2 and 4: Impedance ratio (at 100KHz) at -55°C and +105°C should be within 0.75 to 1.25
	1: At 20 ± 2°C, Impedance, tan δ and capacitance should be measured.	
	2: at -55 ± 3°C, Z -55°C/Z 20°C should be within 0.75 to 1.25	
	3: Keep at 15 to 35°C for 15 minutes or more.	*ΔC/C 20°C: capacitance change at 120 Hz. * tan δ at 120Hz.
	4: at 105 ± 2°C, Z 105°C/Z 20°C should be within 0.75 to 1.25.	
	5: At 20 ± 2°C, ΔC/C : Within±5% of step 1 and tan δ should be less than or equal to the value of item 2.	
8. Damp Heat (steady state)	Temperature: 60 ± 2°C Relative Humidity: 90% ~ 95% Duration: 1000 ± 48 hours	No visible damage Leakage Current ≤ initial value. Capacitance Change: within ±20% of initial value. Tan δ ≤ 1.5* initial value
9. Load Life	Temperature: 105 ± 2°C Applied Voltage: rated voltage Duration: 2000 +72/-0 hours * The capacitors shall be stored under standard atmospheric conditions for 1 to 2 hours, after which measurement shall be made.	No visible damage Capacitance Change: within ±20% of initial specified value. Tan δ ≤ 150% of initial value. Leakage Current ≤ initial value.
10. Solderability	Temperature: 235± 5°C Duration: 2 ± 0.5 seconds	At least 95% of surface of the dipped portion of terminal shall be covered with new solder.

RAPID CHANGE OF TEMPERATURE

Applied voltage: No load

Cycle number: 5 CYCLES

Test diagram: Fig. 1



Performance: After 5 cycles, the capacitors shall meet the following specification.

Item	Performance
Capacitance change	Within $\pm 5\%$ of initial capacitance
Tan δ	Less than or equal to the value of item 7.3
Leakage current	Less than or equal to the value of item 7.5

FAILURE RATE LEVEL

0.5% / 1000 hours (Confidence level: 60%)

Test conditions: Item 7.8 (Endurance)

Failure criteria :

Item	Performance
Capacitance change	Greater than $\pm 30\%$ of initial capacitance
Tan δ	Greater than 3 times of the value of item 2
Leakage current	Greater than 30 times of the value of item 5

VIBRATION

Frequency : 10 to 55 Hz (1 minute interval / 10 → 55 → 10 Hz)

Amplitude : 0.75mm (Total excursion 1.5mm)

Direction : X, Y, Z (3axes)

Duration : 2 hours / axial (Total 6 hours)

Performance : Measured capacitance should be settled when it is within 30 minutes before the end of the test.

Also, after the test, the rate of capacitance change is within $\pm 5\%$ of the initial value.

RESISTANCE TO SOLDERING HEAT

Test condition

(A) Solder bath method

Temperature : $215 \pm 2^\circ\text{C}$

Duration : 90 ± 1 seconds

* Heat protector (t=1.6mm phenol board)

(B) Soldering iron method

Temperature : $400 \pm 10^\circ\text{C}$

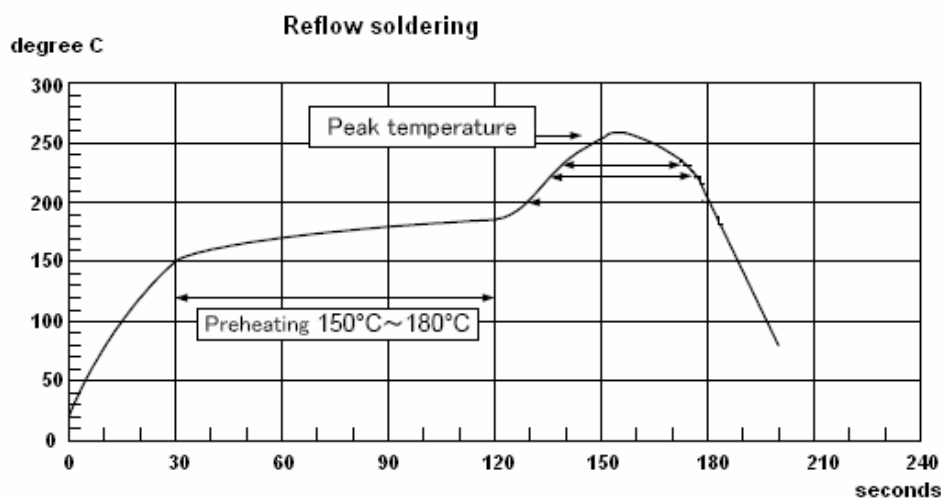
Duration : $3+1, -0$ seconds

* Heat protector (t=1.6mm phenol board)

Performance : After A) or B) test, the capacitors shall meet the following specification

Item	Performance
Capacitance change	Within $\pm 10\%$ of initial capacitance
$\tan\delta$	Less than or equal to 1.3 times of the value of item 2
E.S.R	Less than or equal to 1.3 times of the value of item 3
Leakage current	Less than or equal to the value of item 5

(C) Recommended reflow profile



Peak Temp.	250°C or less	260°C or less
Preheat	150°C to 180°C, 90 to 120 seconds	150°C to 180°C, 90 to 120 seconds
Duration	Within 60 seconds at 200°C and higher	Within 60 seconds at 200°C and higher
	Within 50 seconds at 220°C and higher	Within 50 seconds at 220°C and higher
	Within 40 seconds at 230°C and higher	Within 40 seconds at 230°C and higher
Reflow Cycle	2 times or less	Only one time

Remark1: All temperatures are measured on the topside of the aluminum cans and terminal surfaces.

Remark2: Please contact us if reflow condition request is higher than above.

CLEANING

Concerning about HCFC, higher alcohol system, petroleum system, terpene system, water system with surface active agent and other solvents the washing way (separateness or combinations) by soak, ultrasonic wave, boil, vapor etc. is confirmed under the maker's recommendation. Please contact us if you require further details. Also, please be attentive to the following note as to some sort of solvent.

Note: Please do not store capacitors in sealed container or in solvent after cleaning.

immediate heating after cleaning may causes expansion and (or) shrink of sleeves.

STORAGE

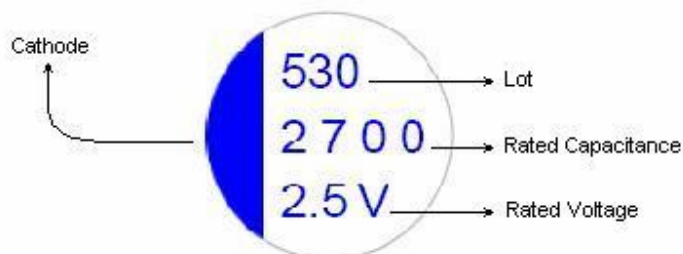
Should be stored at the place where it is not humid. It also gets the no direct rays.

It is within a year to keep sealing off in a plastic bag after delivering.

BODY MARKING

- Series identification
- Rated voltage & Capacitance value

Marking color : BLUE



SKYWELL SCL series and their homogeneous subcomponents are RoHS compliant.

Please contact sales@skywellnet.com if you have any question regarding this specifications

History of Change

Rev.	Effective Date	Changed Contents	Approve By
01	10/30/2003	New release	Joon Won Chang
02	05/30/2005	Revise table 1 and table 2	Joon Won Chang
03	07/08/2005	Add reflow profile	Joon Won Chang
04	08/05/2005	Revise type error on SCL04M122	Jimmy C. Duh
05	10/01/2005	Revise body marking from SCL to Lot	Jimmy C. Duh
06	02/17/2006	Revise part number, add option code	Jimmy C. Duh
07	04/28/2006	Revise From Uni-Con to OP-Con	Jimmy C. Duh