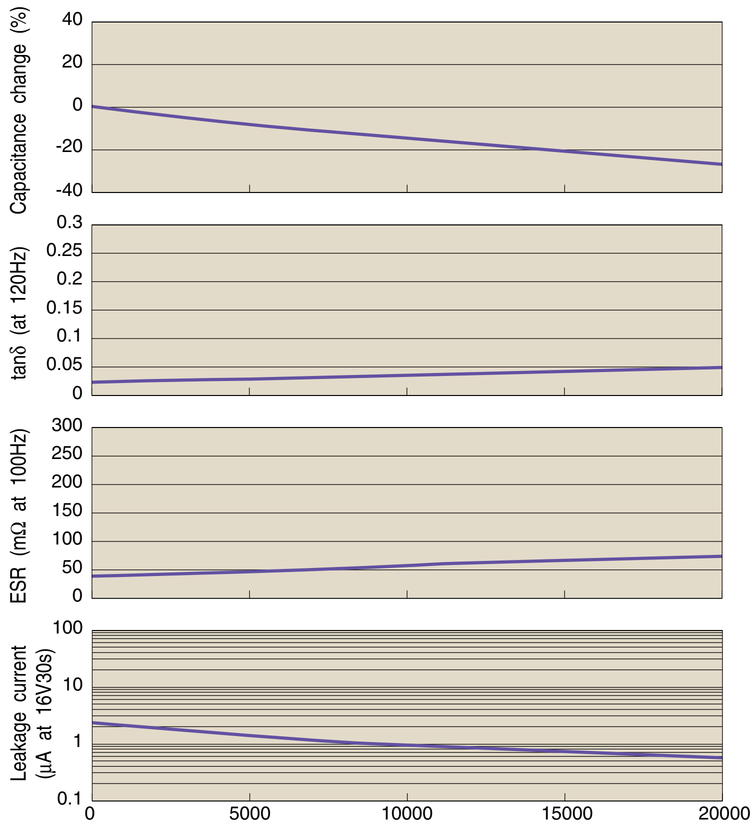
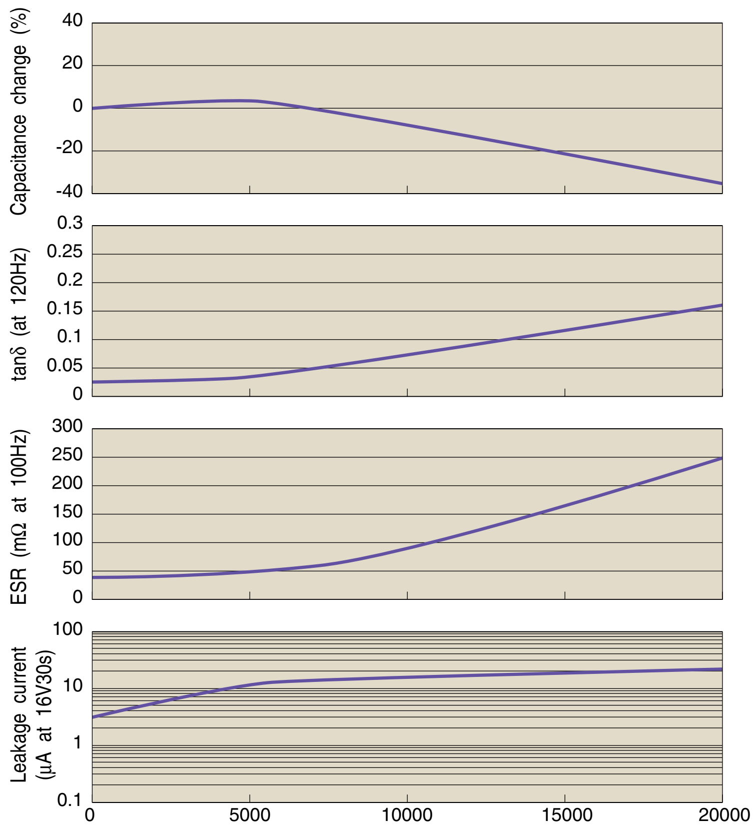
1. TCNQ complex salt type OS-CON (16SH33M)

1-1 Endurance (105°C, applied 16V)



The left fig. shows a tendency of each characteristics of OS-CON (TCNQ complex salt type) in endurance test.
The tendency of capacitance change shows the same as aluminum electrolytic capacitor. However, aluminum electric capacitor has yield point (time) for dry-up of electrolytic solution, but OS-CON doesn't. The capacitance of OS-CON decreases gradually, which is semi-permanent. These changes are little difference if applied voltage or not, except for leakage current.

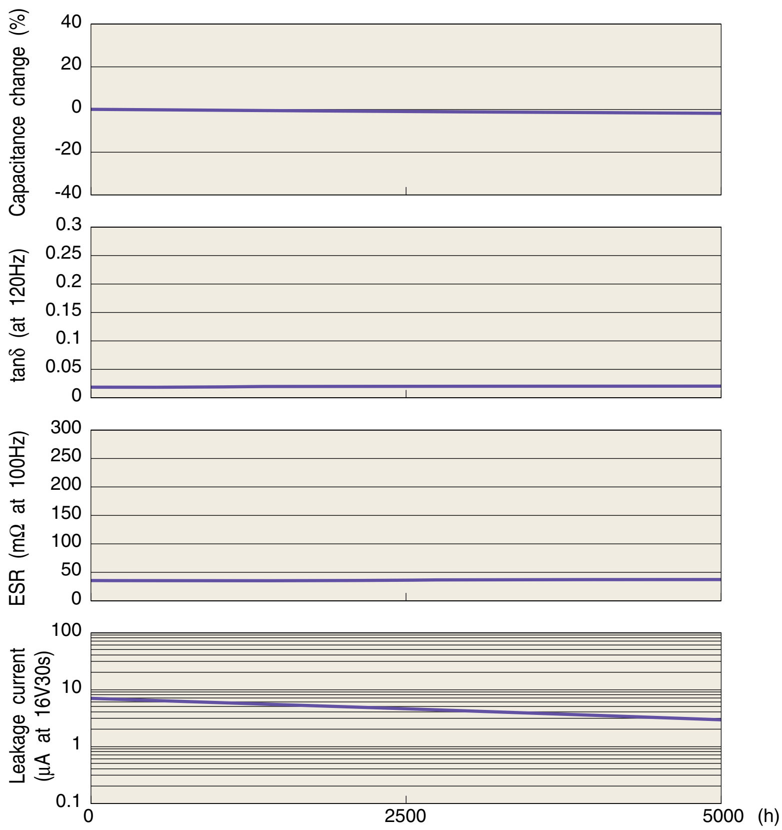
1-2 Damp heat (60°C90% RH, no load)



The left fig. shows a tendency of each characteristics of OS-CON (TCNQ complex salt type) in damp heat test.
Compared with endurance, it seems that the capacitance change is a little rapid. It's necessary to note using OS-CONs when it is damp heat environment, such as the outdoors.

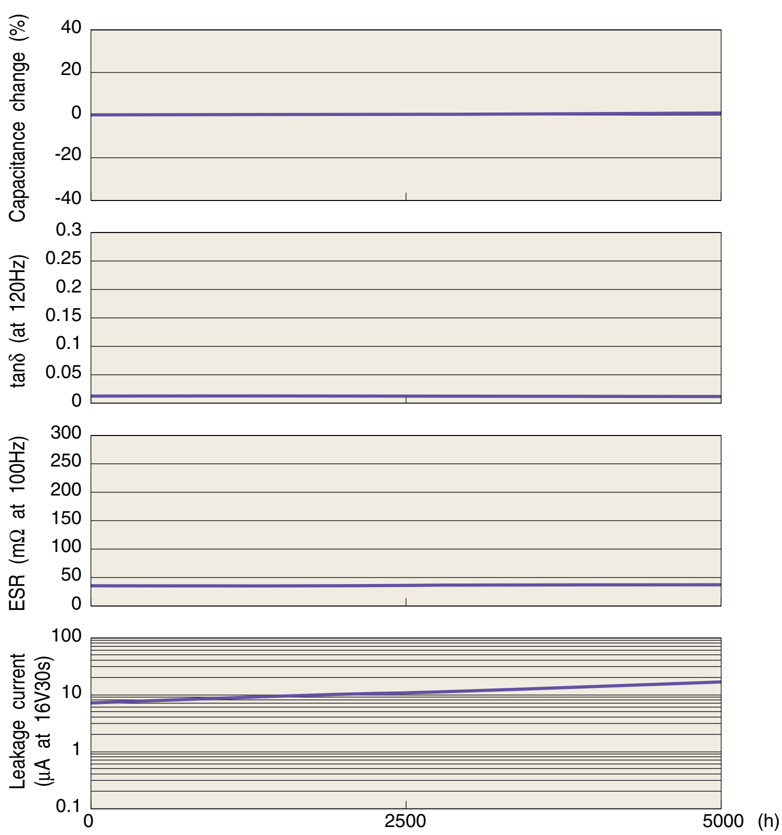
2. Polimerized organic semiconductor type OS-CON (16SVP39M)

2-1 Endurance (105°C, applied 16V)



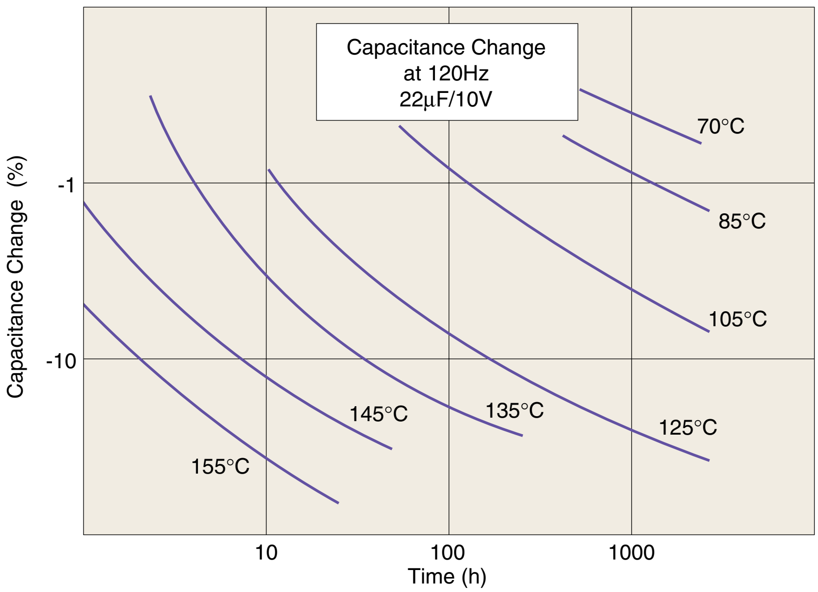
The left fig. shows a tendency of each characteristics of **OS-CON** (Polymerized organic semiconductor type) in endurance test.
There is little change of characteristics after 5000h because of polymerized organic semiconductor that excels in heat proof. Also, the change of characteristics is very little compared with 5000h of **OS-CON** TCNQ complex salt type.

2-2 Damp heat (60°C90% RH, no load)



The left fig. shows a tendency of each characteristics of **OS-CON** (Polymerized organic semiconductor type) in endurance test.
As it is the same as endurance test, there is also little change of characteristics after 5000h because of polymerized organic semiconductor that excels in heat proof. Also, the change of characteristics is very little compared with 5000h of **OS-CON** TCNQ complex salt type.

3. Temperature Acceleration Test (Endurance)



The decrease in capacitance brings lifetime failure of **OS-CON**s, whose main reason depends on temperature.
The left fig. shows the speed of decreasing at each temperature. This graph indicates that temperature coefficient of **OS-CON** lifetime is 10 times by 20°C reduction. Compared with this, aluminum capacitor's is 2 times by 10°C reduction. The followings are converted value at 85 and 65°C by using 105°C X 2000h.
These values are not for guarantees but for presumptive values. It means that the life time of **OS-CON** is longer than other 105°C X 2000h guaranteed products.

Estimation of life time

※**OS-CON**	※Aluminum electrolytic capacitor
105°C → 2,000h	105°C → 2,000h
85°C → 20,000h	85°C → 8,000h
65°C → 200,000h (22years)	65°C → 32,000h (3.6years)

※Guarantee temperature of **OS-CON** is 105°C, except for SVQP series.

4. Factors of Short Circuit Mode

1. Applying voltage over the rated voltage.
2. Applying reverse voltage over the spec.
3. Excessive mechanical stress.
4. Applying rush current by sudden charge or discharge over the spec.

5. Reliability Presumption of life

As described on P44 • 45, an item for endurance, capacitance of **OS-CON** is getting smaller as times go by. This means wear-failure of **OS-CON** is open mode for capacitance-decrease, which is a main failure factor of **OS-CON**.
The lifetime span is different by each operating temperature and self-heating by ripple current. The Presumptive life-span of **OS-CON** is about 10 times 20°C reduction.
The following formula outline could make it possible to estimate the presumptive life span of **OS-CON** at ambient temperature Tx (°C).

※The result of the following estimation is not for guarantees but presumptive values based on actual measurement.

TCNQ complex salt type as electrolyte (SC, SA, SL, SH, SS and SP series)

$$Lx = Lo \times 10^{\frac{To-(Tx+\Delta Tx)}{20}}$$

Lx : Life expectance (h) in actual use (temperature Tx)
Lo : Guaranteed (h) at maximum temperature in use
To : Maximum operating temperature
Tx : Temperature in actual use (ambient temperture of **OS-CON**) (°C)
ΔTx : Self-heating temperature by Ripple current (°C)

$$\Delta Tx = (Ix/Io)^2 \times \Delta T \quad Ix \leqq Io$$

Io : Allowable Ripple current at +45°C or less (Arms)
Ix : Actual flow of Ripple current (Arms)
Note : The value of Ix should be below the value of Io with the coefficient

Ambient Temp (°C)	to +45	+45＜Tx≦+65	+65＜Tx≦+85	+85＜Tx≦+95	+95＜Tx≦105
Coefficient	1.0	0.85	0.7	0.4	0.25

Self-heating value ΔT by maximum allowable Ripple current (+45°C or less) varies according to case size. Refter to the rough values in the chart below :

Case size	A, A', A5	B, B', B6	C, C', C6	D	E, E', E7	F, F', F_0, F8, F12, G, H
ΔT (°C)	8	10	15	16	18	20

Polymarized organic semiconductor type as electrolyte (SVP, SVQP and SEP series)

$$Lx = Lo \times 10^{\frac{To-Tx}{20}}$$

Lx : Life expectance (Hrs.) in actual use (temperature Tx)
Lo : Guaranteed (Hrs.) at maximum temperature in use
To : Maximum operating temperature
Tx : Temperature in actual use (ambient temperture of **OS-CON**) (°C)
The following is the presumptive lifetime at over 105°C, which is concerned with the heat-proof characteristic of seal-rubber.

Temperature in actual use \ Presumptive lifetime	Presumptive lifetime (Lx)	
	SVP, SEP	SVQP
Tx＝105°C	2,000h	5,000h
105°C＜Tx≦115(°C)	———	3,160h
115°C＜Tx≦125(°C)	———	1,000h

No need temperature coefficient for ripple current in SVP, SVQP and SEP series.
The reason is that polymarized organic semiconductor as electrolyte has strong resistance to heat campari with TCNQ complex salt.

Self-heating value (ΔT) ; SVP(C6 to F12), SEP → about 20°C, SVP(A5, B6) → about 10°C, SVQP → about 2°C