



Exclusive features: SP-Cap

- **Very low ESR (Equivalent Series Resistance) characteristics**

The specialty polymer capacitor has very low ESR characteristics which allows it to have rapid current discharge capability. This makes the SP-Cap an excellent choice as a bulk capacitor in CPU applications.

- **Very low impedance characteristics**

- **Stable capacitance characteristics**

The specialty polymer capacitor has stable capacitance characteristics versus changes in the operating temperature and frequency.

- **Voltage derating not required for standard product**

The specialty polymer capacitor usually can be operated at full rated voltage. Voltage derating may be required depending on the operating temperature. (125°C rated product)

- **Stable temperature characteristics**

The specialty polymer capacitor has stable capacitance and ESR characteristics versus changes in operating temperature.

- **High safety taking full advantage of the material**

More difficult to ignite and "smoke" than a tantalum electrolytic capacitor.

- **Surface mounting and reduced height**

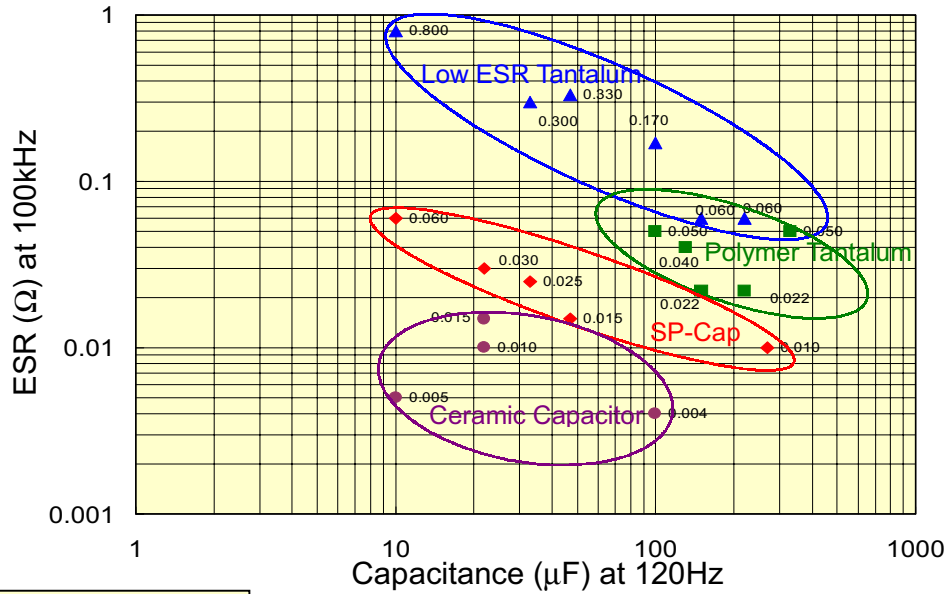
With the adoption of our exclusive new structure, surface mounting and a reduction in height have been achieved.



Comparison with other types of capacitors

Very low ESR and large capacitance

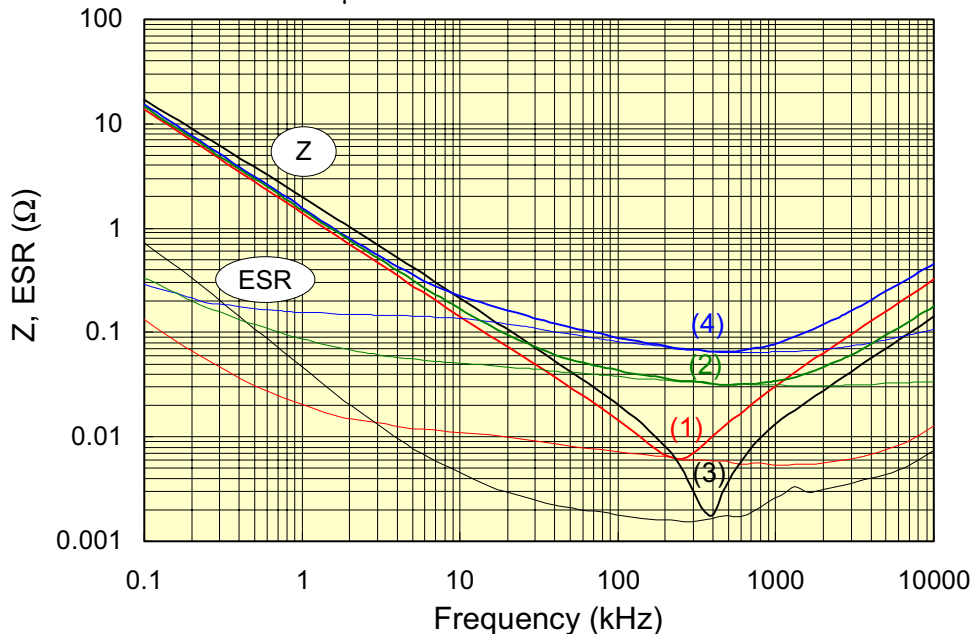
ESR: Approx. 1/10 or less than that of a tantalum capacitor
 Capacitance: Approx. 3 times or more than that of a ceramic capacitor



Very low impedance

Lowest impedance among electrolytic capacitors

- (1) SP-Cap (SL series) 2V100μF
- (2) Polymer Tantalum capacitor 4V100μF
- (3) Ceramic capacitor 6.3V100μF
- (4) Low ESR Tantalum capacitor 10V100μF

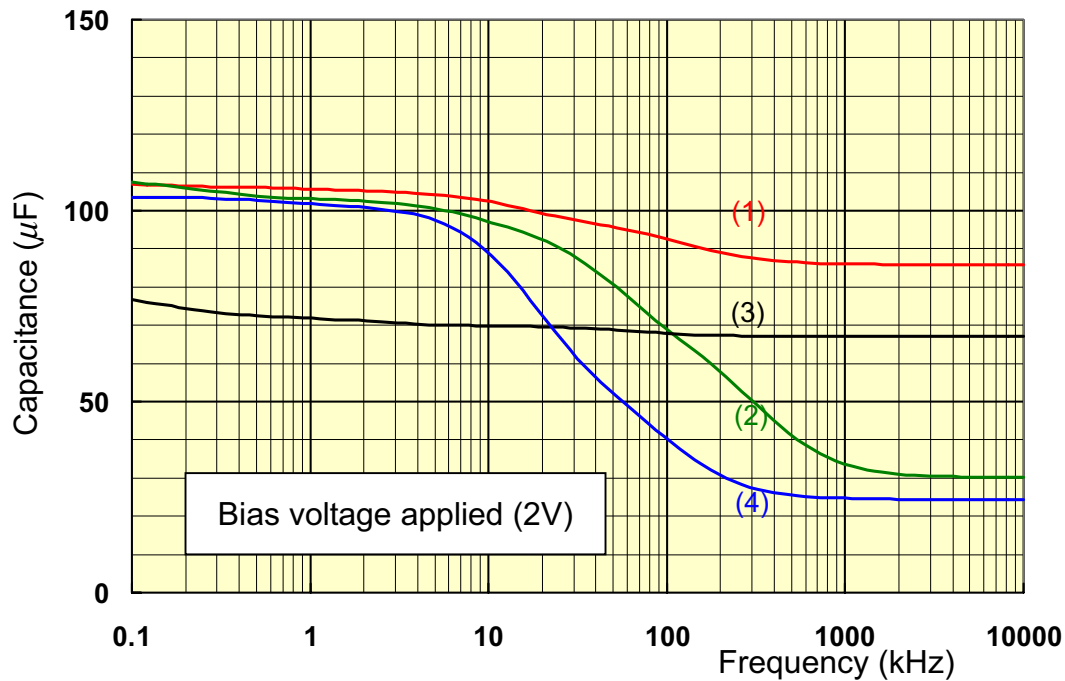
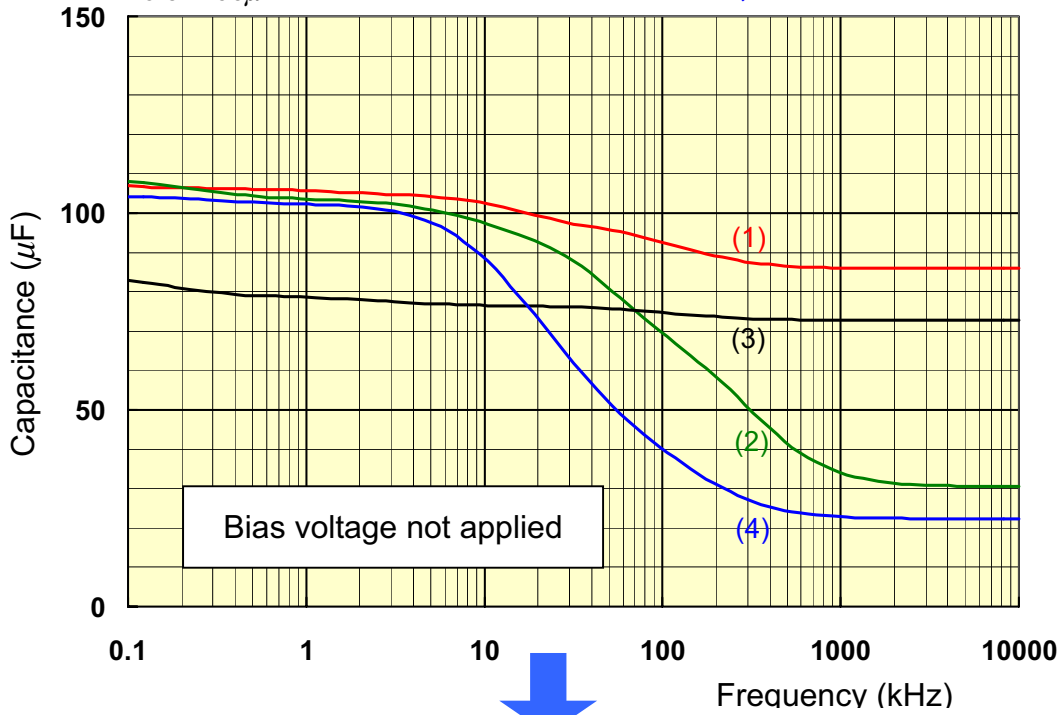




■ Stable capacitance*

- (1) SP-Cap (SL series)
2V100 μ F
- (3) Ceramic capacitor
6.3V100 μ F

- (2) Polymer Tantalum capacitor
4V100 μ F
- (4) Low ESR Tantalum capacitor
10V100 μ F



* Please refer to 'Estimation of capacitance-frequency characteristics using the Ladder model'



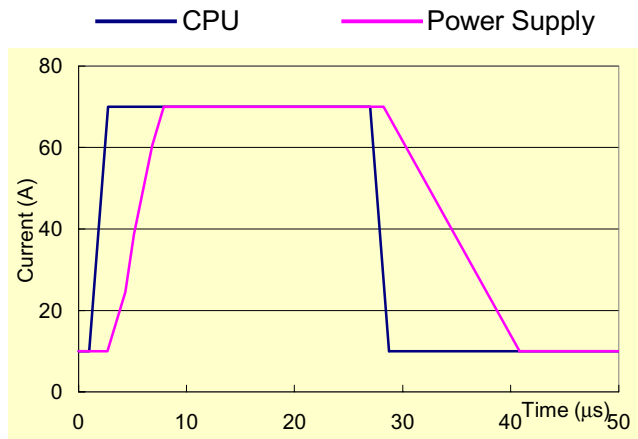
Example of simulation

SP-AL can replace MLCC!
 3 pcs of EEFC0D0101R(2V100 μ F) can replace 30 pcs of MLCC 6.3V10 μ F Y5V 1206.

Circuit conditions

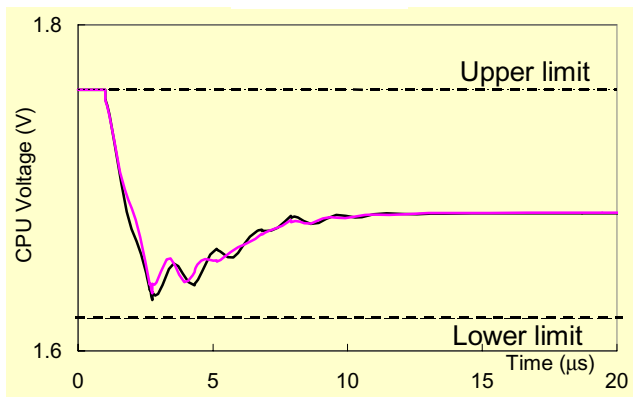
- Vin 11.4V
- Vout 1.75V
- I_{p-p} 60A
(I_{max}:70A I_{min}:10A)
- CPU slew rate 40A/ μ s
- V_{p-p} 140mV
(Transient Resp. +/-25mV)
- Switching Freq. 200kHz x3phase(=600kHz)
- Inductance 1.1 μ H
- Target CPU **Desktop P4 Northwood**

Current behavior of CPU and Power Supply

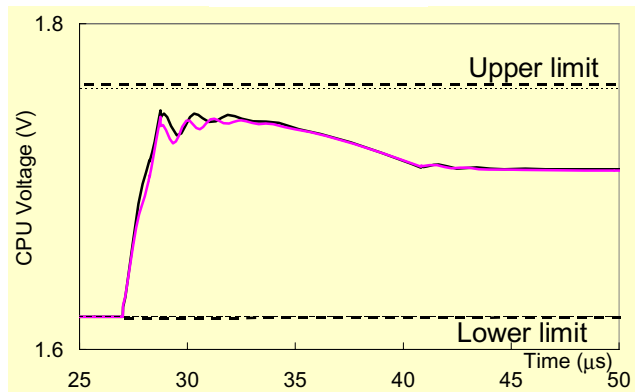


Transient response simulation results

Droop



Overshoot



Line	Capacitor solution	Droop	Overshoot
	Bulk Capacitors: (A-FJ6.3V1500 μ F x8 + OS 4V510 μ F x4)		
—	Bulk Capacitors + MLCC1206(Y5V)10 μ F x38	129mV	127mV
—	Bulk Capacitors + SP-Cap CD2V100 μ F x3 + MLCC1206(Y5V)10 μ F x8	125mV	123mV