Panasonic
INDUSTRY

# Polymer Capacitors

## Speed up your Design – The next Stage of Low ESR

### Key benefits:

- High Miniaturization Potential
- No DC Bias Effect & No Voltage Derating
- No Capacitance Drift
- Long Lifetime & High Reliability

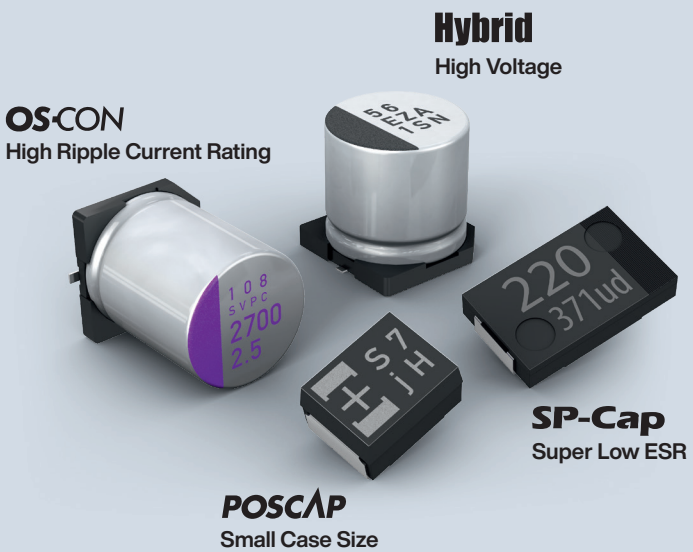
Automotive

LED Lighting

Power Management

Smart Home

# IN Your Future

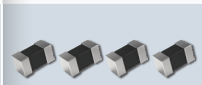



**Your Committed Enabler**

# Low ESR saves space and cost, reduces design complexity

Polymer Capacitors have excellent frequency characteristics. Thanks to their ultra-low ESR values, polymer capacitors exhibit low impedance near their resonance point which reduces AC ripple in power circuits. Polymer capacitors are also very stable, showing no capacitance drift over temperature and no DC bias - this stability simplifies the design process. Polymer Capacitors are very efficient, since they are available in very small case sizes, which significantly contributes to a compact design and cost saving.

## Features

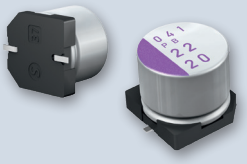
| | | POLYMER | | | | | |
|---|---|---|---|---|---|---|---|
| | Lytic | Hybrid, SP-cap, POSCAP | | OS-CON | | MLCC | MnO2 Tantalum |
| Ripple Current | medium | high | ✓ | high | ✓ | high | medium |
| ESR | medium | low | ✓ | low | ✓ | low | medium |
| Voltage Derating | no | no | ✓ | no | ✓ | not specified | yes |
| Capacitance (against DC Bias) | stable | stable | ✓ | stable | ✓ | decrease | stable |
| Capacitance (against Frequency) | decrease | stable | ✓ | stable | ✓ | stable | decrease |
| Capacitance (against Temperature) | unstable | stable | ✓ | stable | ✓ | decrease | stable |
| Estimated Lifetime | limited | long | ✓ | long | ✓ | long | long |
| Initial Leakage Current | low | low | ✓ | medium | | low | low |
| ex.: Input, 28V line, 100kHz → capacitor requirements: 35V, 22uF, 2Arms ripple | 2pcs Ø10x10.2mm | 1pc 7.3x4.3x1.9mm | | 1pc Ø6.3x7.7mm | | 4pcs 6.1x5.3mm | 4pcs 7.3x4.3x4.3mm |
| |  |  | |  | |  |  |

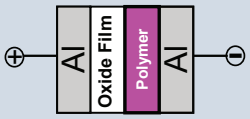
# Polymer Capacitors for demanding applications

## Polymer Aluminum Cap.

**OS-CON is solid capacitor using polymer + Al.**

OS-CON



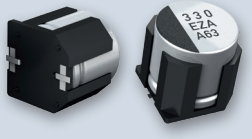

- Low ESR
- High ripple current - 7.5Arms
- Large capacitance - 2700uF (10x13L) max
- Good temperature characteristics
- Long life

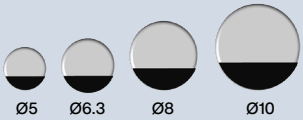
- Size range: dia.4-10 (H4.5-13) mm
- ESR range: 5mΩ to 40mΩ
- Cap. range: 3.3uF to 2700uF
- Rated V range: 2V to 100V

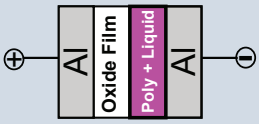
## Hybrid Aluminum Cap.

**Hybrid capacitor has mixed characteristics of E-cap & OS-CON.**

Hybrid





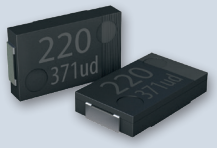

- Low ESR
- Low LC ~ 0.01CVuA
- High voltage ~ 80V/33uF (10x10.2L) lineup
- Good temperature characteristics

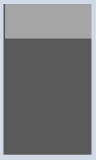
- Size range: dia.5-10 (H6.1-16.8) mm
- ESR range: 8mΩ to 120mΩ
- Cap. range: 10uF to 1000uF
- Rated V range: 25V to 80V

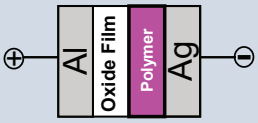
## Polymer Aluminum Cap.

**SP-CAP is solid capacitor using polymer + Al.**

SP-Cap





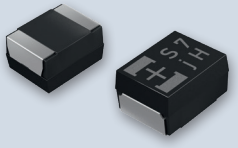

- Super low ESR - 3mOhm min
- High ripple current
- Good temperature characteristics
- Long life

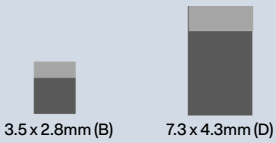
- Size range: 7.3x4.3 (H1-3) mm
- ESR range: 3mΩ to 40mΩ
- Cap. range: 8.2uF to 820uF
- Rated V range: 2V to 6.3V

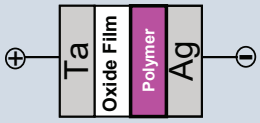
## Polymer Tantalum Cap.

**POSCAP is solid capacitor using polymer + Ta.**

POSCAP






- Small size - 3.5x2.8
- Large capacitance/size
- Low ESR / High ripple current
- Good temperature characteristics
- Long life

- Size range: 3.5x2.8, 7.3x4.3 (H1.2-4)mm
- ESR range: 5mΩ to 50mΩ
- Cap. range: 2.7uF to 1500uF
- Rated V range: 2V to 35V

# Hybrid Capacitors lineups

| Series | Image | High temperature guarantee | Rated voltage range (V) | Capacitance range (uF) | Rated ripple current (Arms) | Size (mm) | AEC-Q200 | Features |
|---|---|---|---|---|---|---|---|---|
| ZA (High temp. reflow) |  | 105°C/10000h | 25~80 | 10~330 | 0.75~2.5 (at 105°C) | 5x5.8~10x10.2 | Compliant | 105°C standard High voltage (80V max) |
| ZC (High temp. reflow) |  | 125°C/4000h | 25~80 | 10~330 | 0.5~2 (at 125°C) | 5x5.8~10x10.2 | Compliant | 125°C standard High voltage (80V max) |
| ZK (High temp. reflow) |  | 125°C/4000h | 25~35 | 33~470 | 0.75~2.8 (at 125°C) | 5x5.8~10x10.2 | Compliant | High capacitance and high ripple current (ZC comparison) |
| ZKU (High temp. reflow) |  | 125°C/4000h | 25~35 | 39~560 | 0.75~2.8 (at 125°C) | 5x5.8~10x10.2 | Compliant | High capacitance (ZK comparison) |
| ZS (High temp. reflow) |  | 135°C/4000h 125°C/4000h | 25~63 | 100~560 | 2.1~2.9 (at 135°C) 3~4 (at 125°C) | 10x12.5, 10x16.5 | Compliant | High ripple current (ZC comparison) High temperature guarantee (135°C) |
| ZU (High temp. reflow) |  | 135°C/4000h 125°C/4000h | 25~63 | 100~560 | 3.2~4.0 (at 135°C) 4.6~5.8 (at 125°C) | 10x12.5, 10x16.5 | Compliant | High ripple current (ZS comparison) High temperature guarantee (135°C) |
| ZSU (High temp. reflow) |  | 125°C/4000h | 25~63 | 120~1000 | 3~4 (at 125°C) | 10x12.5, 10x16.5 | Compliant | Large capacitance (ZS comparison) |
| ZE (High temp. reflow) |  | 145°C/2000h 135°C/4000h | 25~63 | 33~330 | 0.6~0.9 (at 145°C) 1.1~2 (at 135°C) | 8x10.2, 10x10.2 | Compliant | High temperature guarantee (145°C) |
| ZF (High temp. reflow) |  | 150°C/1000h | 25~63 | 33~270 | 0.65~1 (at 150°C) | 8x10.2, 10x10.2 | Compliant | High temperature guarantee (150°C) |
| ZT (High temp. reflow) |  | 125°C/4000h | 25~63 | 33~330 | 2.4~3.5 (at 125°C) | 8x10.2, 10x10.2 | Compliant | High ripple current |
| NEW ZTU (High temp. reflow) |  | 135°C/4000h 125°C/4000h | 25~35 | 220~560 | 1.8~2.2 (at 135°C) 2.9~3.5 (at 125°C) | 8x10.2, 10x10.2 | Compliant | Large capacitance (ZT comparison) High temperature guarantee (135°C) |

# **Endurance - Long lifetime & high reliability

## Hybrid

| 125°C / 4000 h | | |
|---|---|---|
| 125°C → | 4,000 h | 0.5 years |
| 115°C → | 8,000 h | 0.9 years |
| 105°C → | 16,000 h | 1.8 years |
| 95°C → | 32,000 h | 3.7 years |
| 85°C → | 64,000 h | 7.3 years |
| 75°C → | 128,000 h | 14.6 years |

Arrhenius formula 10°C temperature reduction, lifetime is 2x longer

$$Lx = Lo \times 2^{\frac{To - Tx}{10}}$$

The above are reference examples. For detailed lifetime calculation, please contact Panasonic.

## OS-CON

| 125°C / 1000 h | | |
|---|---|---|
| 125°C → | 1,000 h | 0.1 years |
| | | |
| 105°C → | 10,000 h | 1.1 years |
| | | |
| 85°C → | 100,000 h | 11.4 years |

20°C temperature reduction, lifetime is 10x longer

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

To : Maximum operating temperature (°C)
Tx : Temperature in actual use (°C)
Lo : Guaranteed life at maximum temperature in use (h)
Lx : Life expectance in actual use (temperature Tx) (h)
* With max. Ripple Current applied *

# Anti-Vibration - SMD Hybrid & Lytic Capacitors

## Anti-Vibration Features:

- Excellent Anti-Vibration Performance withstands 30G
- Drop-shock resistant
- No significant change when dropped from a height of 1.2 m
- Available for all SMD Hybrid & Lytic Capacitor series with ≥ Ø 6mm


Anti-Vibration Proof Versions available

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