

# SMD Aluminum Conductive Polymer Electrolytic Capacitors

## APA Series



### FEATURES

- Super Low ESR
- Long Life
- 105°C, 5000 hours
- RoHS compliant

### APPLICATIONS

- DC/DC Converters
- Voltage Regulators
- Decoupling
- Computer Motherboards, etc

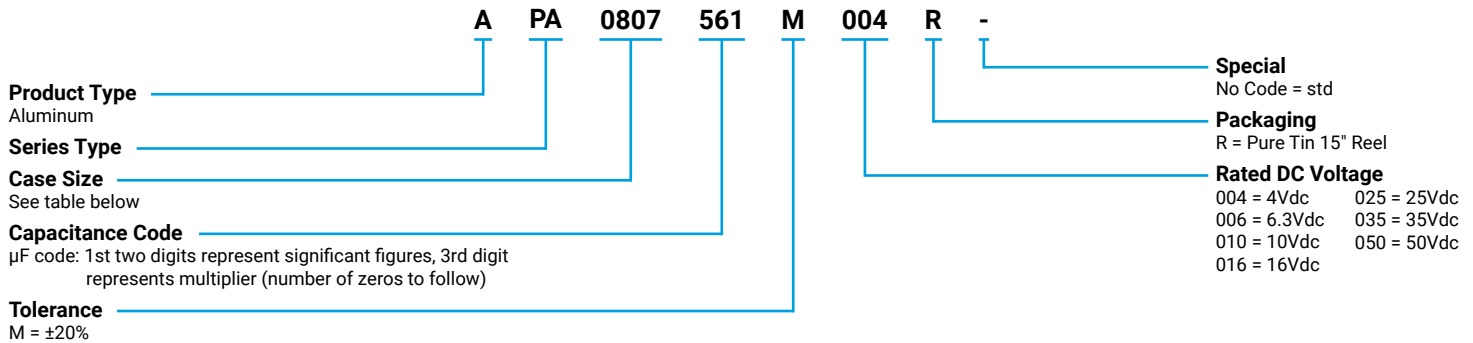


LEAD-FREE  
LEAD-FREE COMPATIBLE  
COMPONENT



RoHS  
COMPLIANT

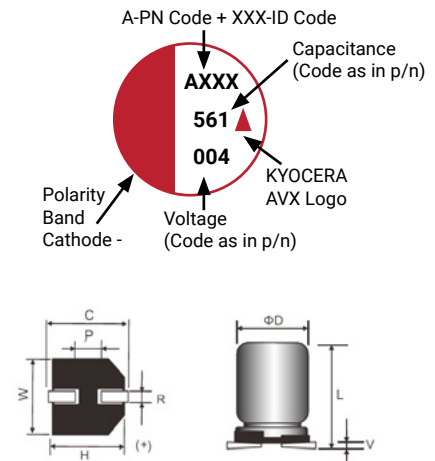
### HOW TO ORDER



### CASE DIMENSIONS millimeters (inches)

| Code | D±0.50<br>(0.020) | L±0.50<br>(0.020) | W±0.20<br>(0.008) | H±0.20<br>(0.008) | C±0.20<br>(0.008) | R                              | P±0.30<br>(0.012) | V max        |
|------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------------------|-------------------|--------------|
| 0606 | 6.30<br>(0.248)   | 6.00<br>(0.236)   | 6.60<br>(0.260)   | 6.60<br>(0.260)   | 7.30<br>(0.287)   | 0.50 - 0.80<br>(0.020 - 0.031) | 2.00<br>(0.080)   | 0.30 (0.012) |
| 0607 | 6.30<br>(0.248)   | 7.00<br>(0.276)   | 6.60<br>(0.260)   | 6.60<br>(0.260)   | 7.30<br>(0.287)   | 0.50 - 0.80<br>(0.020 - 0.031) | 2.00<br>(0.080)   | 0.30 (0.012) |
| 0608 | 6.30<br>(0.248)   | 8.00<br>(0.315)   | 6.60<br>(0.260)   | 6.60<br>(0.260)   | 7.30<br>(0.287)   | 0.50 - 0.80<br>(0.020 - 0.031) | 2.00<br>(0.080)   | 0.30 (0.012) |
| 0609 | 6.30<br>(0.248)   | 9.30<br>(0.366)   | 6.60<br>(0.260)   | 6.60<br>(0.260)   | 7.30<br>(0.287)   | 0.50 - 0.80<br>(0.020 - 0.031) | 2.00<br>(0.080)   | 0.30 (0.012) |
| 0807 | 8.00<br>(0.315)   | 7.00<br>(0.276)   | 8.30<br>(0.327)   | 8.30<br>(0.327)   | 9.00<br>(0.354)   | 0.50 - 0.80<br>(0.020 - 0.031) | 3.20<br>(0.126)   | 0.30 (0.012) |
| 0809 | 8.00<br>(0.315)   | 9.50<br>(0.374)   | 8.30<br>(0.327)   | 8.30<br>(0.327)   | 9.00<br>(0.354)   | 0.70 - 1.10<br>(0.028 - 0.043) | 3.20<br>(0.126)   | 0.30 (0.012) |
| 0812 | 8.00<br>(0.315)   | 12.00<br>(0.472)  | 8.30<br>(0.327)   | 8.30<br>(0.327)   | 9.00<br>(0.354)   | 0.70 - 1.10<br>(0.028 - 0.043) | 3.20<br>(0.126)   | 0.30 (0.012) |
| 1010 | 10.00<br>(0.394)  | 10.50<br>(0.413)  | 10.30<br>(0.406)  | 10.30<br>(0.406)  | 11.00<br>(0.433)  | 0.70 - 1.10<br>(0.028 - 0.043) | 4.50<br>(0.177)   | 0.30 (0.012) |
| 1012 | 10.00<br>(0.394)  | 12.50<br>(0.492)  | 10.30<br>(0.406)  | 10.30<br>(0.406)  | 11.00<br>(0.433)  | 0.70 - 1.10<br>(0.028 - 0.043) | 4.50<br>(0.177)   | 0.30 (0.012) |

### MARKING



### TECHNICAL SPECIFICATIONS

|                                    |                                                   |                                                              |
|------------------------------------|---------------------------------------------------|--------------------------------------------------------------|
| <b>Category Temperature Range:</b> | -55°C to +105°C                                   |                                                              |
| <b>Capacitance Range</b>           | At 25°C, 120Hz                                    | 10µF to 2200µF                                               |
| <b>Capacitance Tolerance:</b>      |                                                   | ±20%                                                         |
| <b>Surge Voltage:</b>              | At 105°C                                          | Rated voltage x 1.15                                         |
| <b>Dissipation Factor (%)</b>      | Measurement Frequency: 120Hz at 25°C              | Please see the ratings and part number reference table below |
| <b>Leakage Current:</b>            | After 2 minutes at rated working voltage at 25°C* | I ≤ 0.2CV or 300µA, whichever is greater                     |

\* Note: In the case of an anomalous reading, re-measure the leakage current after following voltage treatment:  
Voltage treatment: DC rated voltage to be applied to the capacitors for 120 minutes at 105°C.



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TDS-ALUM-0005 | Rev 1

— ALUMINUM CAPACITORS —

# SMD Aluminum Conductive Polymer Electrolytic Capacitors

## APA Series



### CAPACITANCE AND RATED VOLTAGE RANGE (FIGURES DENOTES CASE SIZE)

| Capacitance |      | Rated Voltage DC (V <sub>R</sub> ) |      |            |      |      |      |            |
|-------------|------|------------------------------------|------|------------|------|------|------|------------|
| μF          | Code | 4V                                 | 6.3V | 10V        | 16V  | 25V  | 35V  | 50V        |
| 10          | 100  |                                    |      |            |      |      |      | 0606       |
| 22          | 220  |                                    |      |            |      |      | 0606 |            |
| 33          | 330  |                                    |      |            |      |      |      | 0609       |
| 47          | 470  |                                    |      |            |      | 0606 |      | 0809       |
| 68          | 680  |                                    |      | 0606       |      |      | 0609 | 0812       |
| 82          | 820  |                                    |      |            |      |      |      | 0812       |
| 100         | 101  |                                    | 0606 | 0606       | 0606 | 0609 |      | 1010, 1012 |
| 120         | 121  |                                    |      |            |      |      | 0809 |            |
| 150         | 151  |                                    |      |            |      |      | 0812 |            |
| 180         | 181  |                                    |      |            |      | 0809 |      | 1012       |
| 220         | 221  | 0606                               | 0606 | 0607, 0608 | 0609 | 0812 | 1010 |            |
| 270         | 271  |                                    |      |            |      |      | 1012 |            |
| 330         | 331  |                                    |      | 0609       | 0809 | 1010 |      |            |
| 470         | 471  |                                    | 0609 |            | 0812 | 1012 |      |            |
| 560         | 561  | 0609, 0807                         | 0609 | 0809       | 0812 |      |      |            |
| 680         | 681  |                                    |      | 0812       | 1010 |      |      |            |
| 820         | 821  | 0809                               | 0809 | 1010       | 1012 |      |      |            |
| 1000        | 102  |                                    | 0812 | 1010       |      |      |      |            |
| 1200        | 122  | 0812                               | 1010 | 1012       |      |      |      |            |
| 1500        | 152  | 1010                               |      |            |      |      |      |            |
| 1800        | 182  |                                    | 1012 |            |      |      |      |            |
| 2200        | 222  | 1012                               |      |            |      |      |      |            |

Released ratings

### RATINGS & PART NUMBER REFERENCE

| Part No.        | Case Size | Capacitance (μF) | Rated Voltage (V) | DCL Max. (μA) | DF Max. (%) | ESR Max. @ 100kHz (mΩ) | 100kHz RMS Current (mA)/105°C |
|-----------------|-----------|------------------|-------------------|---------------|-------------|------------------------|-------------------------------|
| 4 Volt          |           |                  |                   |               |             |                        |                               |
| APA0606221M004R | 0606      | 220              | 4                 | 300           | 12          | 20                     | 2800                          |
| APA0609561M004R | 0609      | 560              | 4                 | 448           | 12          | 20                     | 3500                          |
| APA0807561M004R | 0807      | 560              | 4                 | 448           | 12          | 18                     | 3700                          |
| APA0809821M004R | 0809      | 820              | 4                 | 656           | 12          | 15                     | 4000                          |
| APA0812122M004R | 0812      | 1200             | 4                 | 960           | 12          | 15                     | 4450                          |
| APA1010152M004R | 1010      | 1500             | 4                 | 1200          | 12          | 13                     | 4500                          |
| APA1012222M004R | 1012      | 2200             | 4                 | 1760          | 12          | 13                     | 5400                          |
| 6.3 Volt        |           |                  |                   |               |             |                        |                               |
| APA0606101M006R | 0606      | 100              | 6.3               | 300           | 12          | 22                     | 2400                          |
| APA0606221M006R | 0606      | 220              | 6.3               | 300           | 12          | 22                     | 2600                          |
| APA0609471M006R | 0609      | 470              | 6.3               | 592           | 12          | 22                     | 3200                          |
| APA0609561M006R | 0609      | 560              | 6.3               | 705           | 12          | 22                     | 3200                          |
| APA0809821M006R | 0809      | 820              | 6.3               | 1033          | 12          | 20                     | 3850                          |
| APA0812102M006R | 0812      | 1000             | 6.3               | 1260          | 12          | 20                     | 4250                          |
| APA1010122M006R | 1010      | 1200             | 6.3               | 1512          | 12          | 18                     | 4350                          |
| APA1012182M006R | 1012      | 1800             | 6.3               | 2268          | 12          | 18                     | 5200                          |
| 10 Volt         |           |                  |                   |               |             |                        |                               |
| APA0606680M010R | 0606      | 68               | 10                | 300           | 12          | 30                     | 2400                          |
| APA0606101M010R | 0606      | 100              | 10                | 300           | 12          | 30                     | 2400                          |
| APA0607221M010R | 0607      | 220              | 10                | 440           | 12          | 30                     | 2500                          |
| APA0608221M010R | 0608      | 220              | 10                | 440           | 12          | 25                     | 2500                          |
| APA0609331M010R | 0609      | 330              | 10                | 660           | 12          | 30                     | 3150                          |
| APA0809561M010R | 0809      | 560              | 10                | 1120          | 12          | 25                     | 3850                          |
| APA0812681M010R | 0812      | 680              | 10                | 1360          | 12          | 25                     | 4150                          |
| APA1010821M010R | 1010      | 820              | 10                | 1640          | 12          | 20                     | 4250                          |
| APA1010102M010R | 1010      | 1000             | 10                | 2000          | 12          | 20                     | 4250                          |
| APA1012122M010R | 1012      | 1200             | 10                | 2400          | 12          | 20                     | 5100                          |

All technical data relates to an ambient temperature of +25°C. Capacitance and DF are measured at 120Hz, 0.5RMS with DC bias of 2.2 volts. DCL is measured at rated voltage after 5 minutes.

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## APA Series



### RATINGS & PART NUMBER REFERENCE

| Part No.        | Case Size | Capacitance (μF) | Rated Voltage (V) | DCL Max. (μA) | DF Max. (%) | ESR Max. @ 100kHz (mΩ) | 100kHz RMS Current (mA)/105°C |
|-----------------|-----------|------------------|-------------------|---------------|-------------|------------------------|-------------------------------|
| <b>16 Volt</b>  |           |                  |                   |               |             |                        |                               |
| APA0606101M016R | 0606      | 100              | 16                | 320           | 12          | 30                     | 2200                          |
| APA0609221M016R | 0609      | 220              | 16                | 704           | 12          | 30                     | 3050                          |
| APA0809331M016R | 0809      | 330              | 16                | 1056          | 12          | 20                     | 3450                          |
| APA0812471M016R | 0812      | 470              | 16                | 1504          | 12          | 20                     | 4050                          |
| APA0812561M016R | 0812      | 560              | 16                | 1792          | 12          | 20                     | 4150                          |
| APA1010681M016R | 1010      | 680              | 16                | 2176          | 12          | 20                     | 4150                          |
| APA1012821M016R | 1012      | 820              | 16                | 2624          | 12          | 20                     | 5100                          |
| <b>25 Volt</b>  |           |                  |                   |               |             |                        |                               |
| APA0606470M025R | 0606      | 47               | 25                | 300           | 12          | 40                     | 1500                          |
| APA0609101M025R | 0609      | 100              | 25                | 500           | 12          | 35                     | 2800                          |
| APA0809181M025R | 0809      | 180              | 25                | 900           | 12          | 30                     | 3250                          |
| APA0812221M025R | 0812      | 220              | 25                | 1100          | 12          | 30                     | 3900                          |
| APA1010331M025R | 1010      | 330              | 25                | 1650          | 12          | 20                     | 4100                          |
| APA1012471M025R | 1012      | 470              | 25                | 2350          | 12          | 25                     | 4500                          |
| <b>35 Volt</b>  |           |                  |                   |               |             |                        |                               |
| APA0606220M035R | 0606      | 22               | 35                | 300           | 12          | 70                     | 1450                          |
| APA0609680M035R | 0609      | 68               | 35                | 476           | 12          | 60                     | 1500                          |
| APA0809121M035R | 0809      | 120              | 35                | 840           | 12          | 50                     | 1800                          |
| APA0812151M035R | 0812      | 150              | 35                | 1050          | 12          | 50                     | 2850                          |
| APA1010221M035R | 1010      | 220              | 35                | 1540          | 12          | 40                     | 2950                          |
| APA1012271M035R | 1012      | 270              | 35                | 1890          | 12          | 40                     | 3200                          |
| <b>50 Volt</b>  |           |                  |                   |               |             |                        |                               |
| APA0606100M050R | 0606      | 10               | 50                | 300           | 12          | 60                     | 1400                          |
| APA0609330M050R | 0609      | 33               | 50                | 330           | 12          | 30                     | 1700                          |
| APA0809470M050R | 0809      | 47               | 50                | 470           | 12          | 30                     | 2000                          |
| APA0812680M050R | 0812      | 68               | 50                | 680           | 12          | 28                     | 2200                          |
| APA0812820M050R | 0812      | 82               | 50                | 820           | 12          | 28                     | 2300                          |
| APA1010101M050R | 1010      | 100              | 50                | 1000          | 12          | 30                     | 2300                          |
| APA1012101M050R | 1012      | 100              | 50                | 1000          | 12          | 26                     | 2650                          |
| APA1012181M050R | 1012      | 180              | 50                | 1800          | 12          | 26                     | 2950                          |

All technical data relates to an ambient temperature of +25°C. Capacitance and DF are measured at 120Hz, 0.5RMS with DC bias of 2.2 volts. DCL is measured at rated voltage after 5 minutes.

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| Frequency   | 120Hz ≤ F(Hz) < 1K | 1K ≤ F(Hz) < 10K | 10K ≤ F(Hz) < 100K | 100K(Hz) ≤ F<500K |
|-------------|--------------------|------------------|--------------------|-------------------|
| Coefficient | 0.05               | 0.30             | 0.70               | 1.00              |

# SMD Aluminum Conductive Polymer Electrolytic Capacitors

## APA Series



### QUALIFICATION TABLE

| Test                     | APA series (Temperature range -55°C to +105°C)                                                                                                                                                                        |                    |                                       |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------------------------|
|                          | Condition                                                                                                                                                                                                             | Characteristics    |                                       |
| Endurance                | The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 5000 hours at 105°C.                                                                  | Visual examination | no visible damage                     |
|                          |                                                                                                                                                                                                                       | ΔC/C               | ≤ ±20% of the initial limit           |
|                          |                                                                                                                                                                                                                       | DF                 | ≤ 150% of the initial specified limit |
|                          |                                                                                                                                                                                                                       | ESR                | ≤ 150% of the initial specified limit |
|                          |                                                                                                                                                                                                                       | DCL                | ≤ Initial specified limit or less     |
| Damp Heat (Steady State) | The following specifications shall be satisfied when the capacitors are restored to 20°C after subjection them to store at 60°C, 90 to 95% RH for 1000 hours, without DC applied.                                     | Visual examination | ≤ no visible damage                   |
|                          |                                                                                                                                                                                                                       | ΔC/C               | ≤ ±20% of the initial limit           |
|                          |                                                                                                                                                                                                                       | DF                 | ≤ 150% of the initial specified limit |
|                          |                                                                                                                                                                                                                       | ESR                | ≤ 150% of the initial specified limit |
|                          |                                                                                                                                                                                                                       | DCL                | ≤ Initial specified limit or less     |
| Surge Voltage            | The capacitors shall be subjected to 1000 cycles each consisting of charge with the surge voltages specified at 105°C for 30 seconds. Through a protective resistor (R = 1kΩ) and discharge for 5 minutes 30 seconds. | Visual examination | ≤ no visible damage                   |
|                          |                                                                                                                                                                                                                       | ΔC/C               | ≤ ±20% of the initial limit           |
|                          |                                                                                                                                                                                                                       | DF                 | ≤ 150% of the initial specified limit |
|                          |                                                                                                                                                                                                                       | ESR                | ≤ 150% of the initial specified limit |
|                          |                                                                                                                                                                                                                       | DCL                | ≤ Initial specified limit or less     |

### REFLOW

|                             |                                  |                    |
|-----------------------------|----------------------------------|--------------------|
| Peak Temperature            | 260°C, 10 + 1 sec.               | 250°C, 10 + 1 sec. |
| Preheat Temperature         | 150°C to 180°C, 90 ± 3 sec. max. |                    |
| Duration at 200°C or higher | 60 sec. max.                     | 60 sec. max.       |
| Duration at 220°C or higher | 50 sec. max.                     | 50 sec. max.       |
| Duration at 230°C or higher | 40 sec. max.                     | 40 sec. max.       |
| Reflow Number               | Once                             | Twice or less      |

### STORAGE

1. It is recommended to keep capacitors between the ambient temperatures of 5°C to 35°C and a relative humidity of 75% or below.
2. Confirm that the environment does not have any of the following conditions:
  - Damp conditions such as water, saltwater spray, or oil spray or fumes. High humidity or humidity condensation situations.
  - In an atmosphere filled with toxic gasses (such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.).
  - Being exposed to direct sunlight, ozone, ultraviolet ray, or radiation.
  - Being exposed to acidic or alkaline solutions.
  - Under severe conditions where vibration and / or mechanical shock exceed the applicable ranges of the specification.
- 3.

| Category         | Description    | Storage Life                                                              |
|------------------|----------------|---------------------------------------------------------------------------|
| Mid-High Voltage | 160V and above | 2yrs, after 1yr, needs to check characteristics, if NG, needs to do aging |
| Low Voltage      | 120V and below | 2yrs                                                                      |

Remark: Re-aging condition depends on its own spec.

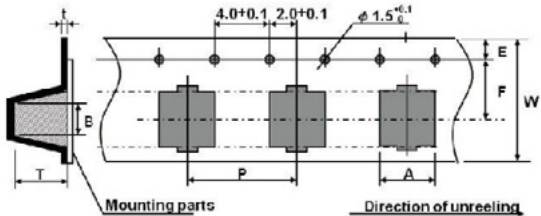
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## APA Series

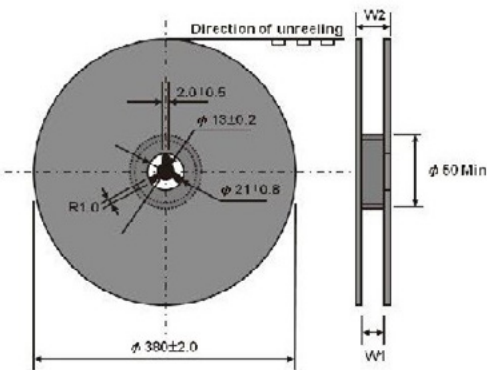


### PACKAGE TAPE DIMENSIONS units (mm)

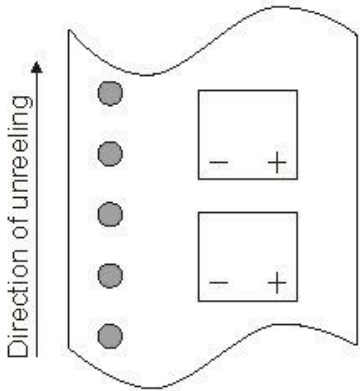
| Size Code | A±0.20 | B±0.20 | W±0.30 | F±0.10 | E±0.10 | P±0.10 | t±0.10 | T±0.20      |
|-----------|--------|--------|--------|--------|--------|--------|--------|-------------|
| 0606      | 7.0    | 7.0    | 16.0   | 7.5    | 1.75   | 12.0   | 0.4    | 8.0         |
| 0607-0608 | 7.0    | 7.0    | 16.0   | 7.5    | 1.75   | 12.0   | 0.4    | 8.0         |
| 0609      | 7.0    | 7.0    | 16.0   | 7.5    | 1.75   | 12.0   | 0.4    | 10.0        |
| 0807      | 8.7    | 8.7    | 24.0   | 11.5   | 1.75   | 16.0   | 0.4    | 8.8         |
| 0809      | 8.7    | 8.7    | 24.0   | 11.5   | 1.75   | 16.0   | 0.4    | 10.5        |
| 0812      | 8.7    | 8.7    | 24.0   | 11.5   | 1.75   | 16.0   | 0.4    | 13.0        |
| 1010      | 10.7   | 10.7   | 24.0   | 11.5   | 1.75   | 16.0   | 0.4    | 11.0        |
| 1012      | 10.7   | 10.7   | 24.0   | 11.5   | 1.75   | 16.0   | 0.4    | 13.0 - 13.5 |



### REEL



### POLARITY



### DIMENSIONS units (mm)

| Size Code | W1±1.00 | W2±1.00 | Qty./Reel |
|-----------|---------|---------|-----------|
| 0606-0608 | 18.0    | 22.0    | 1000      |
| 0609      | 18.0    | 22.0    | 800       |
| 0807-0809 | 26.0    | 31.0    | 500       |
| 1010      | 26.0    | 31.0    | 500       |
| 0812-1012 | 26.0    | 31.0    | 400       |