

SMD Aluminum Conductive Polymer Electrolytic Capacitors

APA Series



FEATURES

- Super Low ESR
- Long Life
- 105°C, 5000 hours
- RoHS Compliance and Halogen-free

APPLICATIONS

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



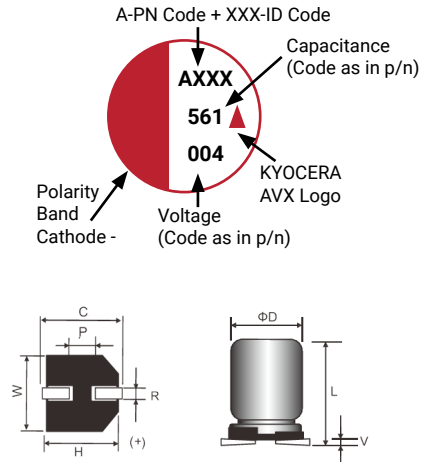
HOW TO ORDER

A	PA	0807	561	M	004	R	-
Product Type Aluminum	Series Type	Case Size See table below	Capacitance Code µF code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow)	Tolerance M = ±20%	Rated DC Voltage 002 = 2.5Vdc 004 = 4Vdc 006 = 6.3Vdc 010 = 10Vdc 016 = 16Vdc 025 = 25Vdc 035 = 35Vdc 050 = 50Vdc 100 = 100Vdc	Packaging R = 15" Reel (Material details available upon request)	Special No Code = std

CASE DIMENSIONS millimeters (inches)

Code	D±0.50 (0.020)	L±0.50 (0.020)	W±0.20 (0.008)	H±0.20 (0.008)	C±0.20 (0.008)	R	P±0.30 (0.012)	V max	Typical Weight (g)
0507	5.00 (0.197)	7.00 (0.276)	5.30 (0.209)	5.30 (0.209)	6.00 (0.236)	0.50 - 0.80 (0.020 - 0.031)	1.40 (0.055)	0.30 (0.012)	0.25
0604	6.30 (0.248)	4.50 (0.177)	6.60 (0.260)	6.60 (0.260)	7.30 (0.287)	0.50 - 0.90 (0.020 - 0.035)	2.00 (0.080)	0.30 (0.012)	0.24
0606	6.30 (0.248)	6.00 (0.236)	6.60 (0.260)	6.60 (0.260)	7.30 (0.287)	0.50 - 0.90 (0.020 - 0.035)	2.00 (0.080)	0.30 (0.012)	0.32
0607	6.30 (0.248)	7.00 (0.276)	6.60 (0.260)	6.60 (0.260)	7.30 (0.287)	0.50 - 0.90 (0.020 - 0.035)	2.00 (0.080)	0.30 (0.012)	0.41
0608	6.30 (0.248)	8.00 (0.315)	6.60 (0.260)	6.60 (0.260)	7.30 (0.287)	0.50 - 0.90 (0.020 - 0.035)	2.00 (0.080)	0.30 (0.012)	0.41
0609	6.30 (0.248)	9.30 (0.366)	6.60 (0.260)	6.60 (0.260)	7.30 (0.287)	0.50 - 0.90 (0.020 - 0.035)	2.00 (0.080)	0.30 (0.012)	0.42
0677	6.30 (0.248)	7.70 (0.303)	6.60 (0.260)	6.60 (0.260)	7.30 (0.287)	0.50 - 0.90 (0.020 - 0.035)	2.00 (0.080)	0.30 (0.012)	0.41
0807	8.00 (0.315)	7.00 (0.276)	8.30 (0.327)	8.30 (0.327)	9.00 (0.354)	0.70 - 1.10 (0.028 - 0.043)	3.20 (0.126)	0.30 (0.012)	0.53
0809	8.00 (0.315)	9.50 (0.374)	8.30 (0.327)	8.30 (0.327)	9.00 (0.354)	0.70 - 1.10 (0.028 - 0.043)	3.20 (0.126)	0.30 (0.012)	0.64
0812	8.00 (0.315)	12.00 (0.472)	8.30 (0.327)	8.30 (0.327)	9.00 (0.354)	0.70 - 1.10 (0.028 - 0.043)	3.20 (0.126)	0.30 (0.012)	0.84
1010	10.00 (0.394)	10.50 (0.413)	10.30 (0.406)	10.30 (0.406)	11.00 (0.433)	0.70 - 1.10 (0.028 - 0.043)	4.50 (0.177)	0.30 (0.012)	1.17
1012	10.00 (0.394)	12.50 (0.492)	10.30 (0.406)	10.30 (0.406)	11.00 (0.433)	0.70 - 1.10 (0.028 - 0.043)	4.50 (0.177)	0.30 (0.012)	1.46

MARKING



TECHNICAL SPECIFICATIONS

Category Temperature Range:	-55°C to +105°C	
Capacitance Range	At 25°C, 120Hz	10µF to 2200µF
Capacitance Tolerance:		±20%
Surge Voltage:	At 105°C	Rated voltage x 1.15
Dissipation Factor (%)	Measurement Frequency: 120Hz at 25°C	Please see the ratings and part number reference table below
Leakage Current:	After 2 minutes at rated working voltage at 25°C* $I \leq 0.2CV$ 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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CAPACITANCE AND RATED VOLTAGE RANGE (FIGURES DENOTES CASE SIZE)

Capacitance		Rated Voltage DC (V _R)								
μF	Code	2.5	4V	6.3V	10V	16V	25V	35V	50V	100V
10	100								0606	0807, 0809
15	150						0604			
22	220							0606		
33	330						0604		0609	
47	470					0604	0606		0809	
68	680				0606			0609	0812	
82	820					0604			0812	
100	101			0606	0604, 0606	0606	0609		1010, 1012	
120	121							0809		
150	151							0812		
180	181					0607	0809		1012	
220	221	0604	0606	0507, 0604, 0606	0607, 0608	0609	0812	1010	1012	
270	271					0609		1012		
330	331	0604			0609	0809	1010			
390	391	0507								
470	471			0609		0812, 1012	1012			
560	561	0606	0609, 0807	0609	0809	0812				
680	681				0812	1010				
820	821	0677	0809	0809	1010	1012				
1000	102			0812	1010	1012				
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	MSL
2.5 Volt								
APA0604221M002R	0604	220	2.5	300	12	20	2100	1
APA0604331M002R	0604	330	2.5	300	12	20	2400	1
APA0507391M002R	0507	390	2.5	300	12	15	3160	1
APA0606561M002R	0606	560	2.5	300	12	10	2800	1
APA0677821M002R	0677	820	2.5	410	12	7	3000	1
4 Volt								
APA0606221M004R	0606	220	4	300	12	20	2800	1
APA0609561M004R	0609	560	4	448	12	20	3500	1
APA0807561M004R	0807	560	4	448	12	18	3700	1
APA0809821M004R	0809	820	4	656	12	15	4000	1
APA0812122M004R	0812	1200	4	960	12	15	4450	1
APA1010152M004R	1010	1500	4	1200	12	13	4500	1
APA1012222M004R	1012	2200	4	1760	12	13	5400	1
6.3 Volt								
APA0606101M006R	0606	100	6.3	300	12	22	2400	1
APA0507221M006R	0507	220	6.3	300	12	20	2800	1
APA0604221M006R	0604	220	6.3	300	12	17	1500	1
APA0606221M006R	0606	220	6.3	300	12	22	2600	1
APA0609471M006R	0609	470	6.3	592	12	22	3200	1
APA0609561M006R	0609	560	6.3	705	12	22	3200	1
APA0809821M006R	0809	820	6.3	1033	12	20	3850	1
APA0812102M006R	0812	1000	6.3	1260	12	20	4250	1
APA1010122M006R	1010	1200	6.3	1512	12	18	4350	1
APA1012182M006R	1012	1800	6.3	2268	12	18	5200	1

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.



The Important Information/Disclaimer is incorporated in the catalog where these specifications came from or available online at www.kyocera-avx.com/disclaimer/ by reference and should be reviewed in full before placing any order.

TDS-ALUM-0005 | Rev 10

— ALUMINUM CAPACITORS —

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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	MSL
10 Volt								
APA0606680M010R	0606	68	10	300	12	30	2400	1
APA0604101M010R	0604	100	10	300	12	40	1500	1
APA0606101M010R	0606	100	10	300	12	30	2400	1
APA0607221M010R	0607	220	10	440	12	30	2500	1
APA0608221M010R	0608	220	10	440	12	25	2500	1
APA0609331M010R	0609	330	10	660	12	30	3150	1
APA0809561M010R	0809	560	10	1120	12	25	3850	1
APA0812681M010R	0812	680	10	1360	12	25	4150	1
APA1010821M010R	1010	820	10	1640	12	20	4250	1
APA1010102M010R	1010	1000	10	2000	12	20	4250	1
APA1012122M010R	1012	1200	10	2400	12	20	5100	1
16 Volt								
APA0604470M016R	0604	47	16	300	12	50	1100	1
APA0604820M016R	0604	82	16	300	12	40	1500	1
APA0606101M016R	0606	100	16	320	12	30	2200	1
APA0607181M016R	0607	180	16	576	12	24	3300	1
APA0609221M016R	0609	220	16	704	12	30	3050	1
APA0609271M016R	0609	270	16	864	12	10	5080	1
APA0809331M016R	0809	330	16	1056	12	20	3450	1
APA0812471M016R	0812	470	16	1504	12	20	4050	1
APA1012471M016R	1012	470	16	1504	12	20	5100	1
APA0812561M016R	0812	560	16	1792	12	20	4150	1
APA1010681M016R	1010	680	16	2176	12	20	4150	1
APA1012821M016R	1012	820	16	2624	12	20	5100	1
APA1012102M016R	1012	1000	16	3200	12	15	5400	1
25 Volt								
APA0604150M025R	0604	15	25	300	12	45	930	1
APA0604330M025R	0604	33	25	300	12	100	1020	1
APA0606470M025R	0606	47	25	300	12	40	1500	1
APA0609101M025R	0609	100	25	500	12	35	2800	1
APA0809181M025R	0809	180	25	900	12	30	3250	1
APA0812221M025R	0812	220	25	1100	12	30	3900	1
APA1010331M025R	1010	330	25	1650	12	20	4100	1
APA1012471M025R	1012	470	25	2350	12	25	4500	1
35 Volt								
APA0606220M035R	0606	22	35	300	12	70	1450	1
APA0609680M035R	0609	68	35	476	12	60	1500	1
APA0809121M035R	0809	120	35	840	12	50	1800	1
APA0812151M035R	0812	150	35	1050	12	50	2850	1
APA1010221M035R	1010	220	35	1540	12	40	2950	1
APA1012271M035R	1012	270	35	1890	12	40	3200	1
50 Volt								
APA0606100M050R	0606	10	50	300	12	60	1400	1
APA0609330M050R	0609	33	50	330	12	30	1700	1
APA0809470M050R	0809	47	50	470	12	30	2000	1
APA0812680M050R	0812	68	50	680	12	28	2200	1
APA0812820M050R	0812	82	50	820	12	28	2300	1
APA1010101M050R	1010	100	50	1000	12	30	2300	1
APA1012101M050R	1012	100	50	1000	12	26	2650	1
APA1012181M050R	1012	180	50	1800	12	26	2950	1
APA1012221M050R	1012	220	50	2200	12	26	3200	1
100 Volt								
APA0807100M100R	0807	10	100	200	12	75	1200	1
APA0809100M100R	0809	10	100	200	12	50	1500	1

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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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

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

- It is recommended to keep capacitors between the ambient temperatures of 5°C to 35°C (if between 35°C to 85°C, it should be less than three months) and the relative humidity of 75% or below.
- Confirm that the environment does not have any of the following conditions:
 - Damp conditions such as water, saltwater spray, 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.
- Shelf life

Years		
0-1	1-2	>2
Ok	Ok	Performance check

- Years from manufacturing date code.
- KYOCERA AVX does not guarantee or assume responsibility for product behavior after 3 years of storage.
- Ageing procedure should be performed as follows:
 - Connect the capacitor in series to a 1kΩ resistor, and apply half rated voltage for 2 hours.
 - After half rated voltage for 2 hours applied, increase and apply rated voltage for another 2 hours.

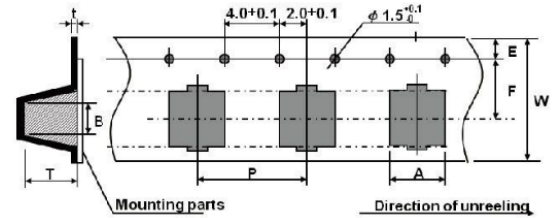
SMD Aluminum Conductive Polymer Electrolytic Capacitors

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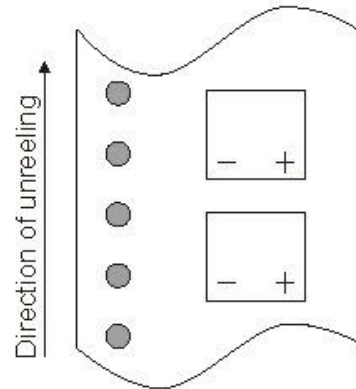
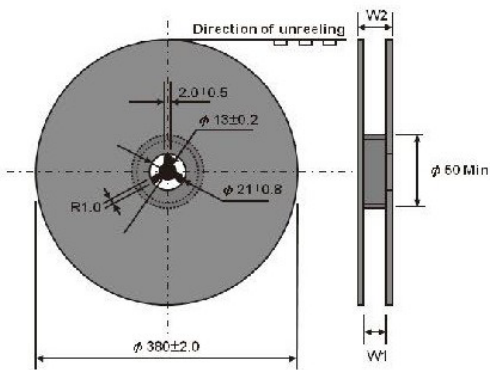
PACKAGE TAPE DIMENSIONS units (mm)

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
0507	5.7	5.7	12.0	5.5	1.75	12.0	0.4	7.5
0604	7.0	7.0	16.0	7.5	1.75	12.0	0.4	8.0
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
0677	7.0	7.0	16.0	7.5	1.75	12.0	0.4	8.3
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
0507	14.0	18.0	1000
0604	18.0	22.0	1200
0606-0608	18.0	22.0	1000
0609	18.0	22.0	800
0677	18.0	22.0	1000
0807-0809	26.0	31.0	500
1010	26.0	31.0	500
0812-1012	26.0	31.0	400

RECOMMENDED LAND PATTERN DIMENSION OF PCB

Size Code	A (mm)	B (mm)	C (mm)
0507	1.4	3.0	1.6
0604	1.9	3.5	1.6
0606	1.9	3.5	1.6
0607	1.9	3.5	1.6
0608	1.9	3.5	1.6
0609	1.9	3.5	1.6
0677	1.9	3.5	1.6
0807	3.1	4.2	2.2
0809	3.1	4.2	2.2
0812	3.1	4.2	2.2
1010	4.5	4.4	2.2
1012	4.5	4.4	2.2

