

SMD Aluminum Conductive Polymer Electrolytic Capacitors

APD Series



FEATURES

- Endurance: 2000 hours at 105°C
- High Voltage
- RoHS Compliance and Halogen-free

APPLICATIONS

- Lamps
- LED
- Power Supply



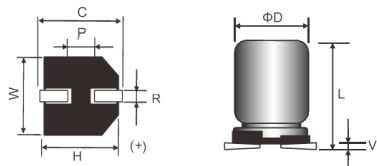
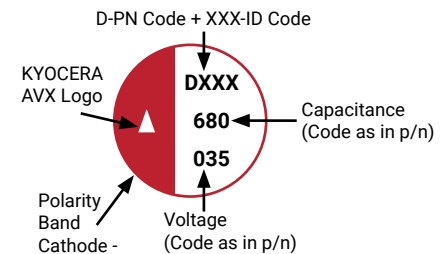
HOW TO ORDER

A	PD	0606	680	M	035	R	-
Product Type Aluminum Chip Capacitors	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 035 = 35Vdc 050 = 50Vdc 063 = 63Vdc	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)
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)	0.27
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)	0.39
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)	0.61
0811	8.00 (0.315)	11.50 (0.453)	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)	0.75
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)	1.32

MARKING



TECHNICAL SPECIFICATIONS

Category Temperature Range:	-55°C to +105°C	
Capacitance Range	At 25°C,120Hz	22µF to 470µF
Capacitance Tolerance:	At 25°C,120Hz	±20%
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 ≤ 0.2CV or 500µA, 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	35V	50V	63V
22	220	0606	0609	0609
27	270	0606		
33	330	0606	0609	0609
47	470	0606, 0609	0609	0809
56	560			0811
68	680	0606, 0609	0811	
82	820		0811, 1012	
100	101	0609, 0809, 0811	0809, 0811, 1012	1012
120	121		0811	
150	151	0811	1012	
220	221	0811	1012	
270	271	0811, 1012		
330	331	1012		
470	471	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
35 Volt								
APD0606220M035R	0606	22	35	500	12	54	1100	1
APD0606270M035R	0606	27	35	500	12	54	1100	1
APD0606330M035R	0606	33	35	500	12	54	1100	1
APD0606470M035R	0606	47	35	500	12	40	1100	1
APD0609470M035R	0609	47	35	500	12	45	1500	1
APD0606680M035R	0606	68	35	500	12	40	1100	1
APD0609680M035R	0609	68	35	500	12	36	1800	1
APD0609101M035R	0609	100	35	700	12	36	2200	1
APD0809101M035R	0809	100	35	700	12	36	2900	1
APD0811101M035R	0811	100	35	700	12	27	3100	1
APD0811151M035R	0811	150	35	1050	12	27	3100	1
APD0811221M035R	0811	220	35	1540	12	27	2500	1
APD0811271M035R	0811	270	35	1890	12	27	2600	1
APD1012271M035R	1012	270	35	1890	12	27	2800	1
APD1012331M035R	1012	330	35	2310	12	27	2800	1
APD1012471M035R	1012	470	35	3290	12	27	3100	1
50 Volt								
APD0609220M050R	0609	22	50	500	12	72	840	1
APD0609330M050R	0609	33	50	500	12	72	890	1
APD0609470M050R	0609	47	50	500	12	54	1400	1
APD0811680M050R	0811	68	50	680	12	27	2100	1
APD0811820M050R	0811	82	50	820	12	27	2100	1
APD1012820M050R	1012	82	50	820	12	27	2100	1
APD0809101M050R	0809	100	50	1000	12	54	1500	1
APD0811101M050R	0811	100	50	1000	12	27	2100	1
APD1012101M050R	1012	100	50	1000	12	27	2200	1
APD0811121M050R	0811	120	50	1200	12	27	2100	1
APD1012151M050R	1012	150	50	1500	12	27	2200	1
APD1012221M050R	1012	220	50	2200	12	27	2400	1
63 Volt								
APD0609220M063R	0609	22	63	500	12	72	520	1
APD0609330M063R	0609	33	63	500	12	54	520	1
APD0809470M063R	0809	47	63	592	12	54	1000	1
APD0811560M063R	0811	56	63	706	12	36	1000	1
APD1012101M063R	1012	100	63	1260	12	36	1600	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) < 1kHz	1kHz ≤ f(Hz) < 10kHz	10kHz ≤ f(Hz) < 100kHz	100kHz ≤ f(Hz) < 500kHz
Coefficient	0.05	0.30	0.70	1.00

QUALIFICATION TABLE

Test	APD 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 2000 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
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 2000 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
Surge Voltage	The capacitors shall be subjected to 1000 cycles each consisting of charge with the surge voltages specified at normal temperature 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

REFLOW

Peak Temperature	260°C, 10 sec. max
Preheat Temperature	150°C to 180°C, 90 sec. max.
Duration at 200°C or higher	60 sec. max.
Duration at 230°C or higher	40 sec. max.
Reflow Number	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.

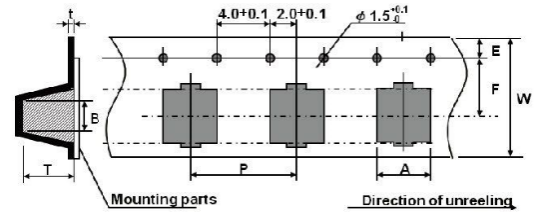
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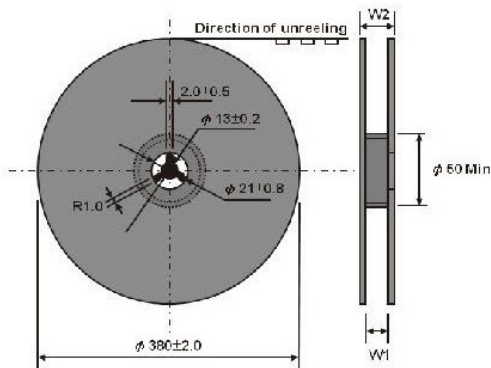


PACKAGE TAPE DIMENSIONS units (mm)

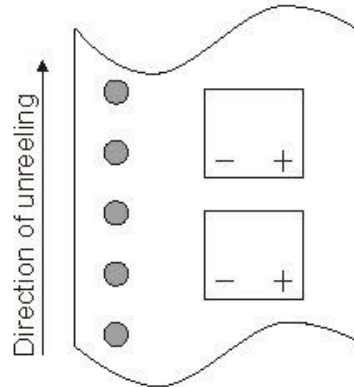
Size Code	A±0.20	B±0.20	W±0.30	F±0.10	E±0.10	P±0.10	t±0.10	T±0.20
0606	7.0	7.0	16.0	7.5	1.75	12.0	0.4	8.0
0609	7.0	7.0	16.0	7.5	1.75	12.0	0.4	10.0
0809	8.7	8.7	24.0	11.5	1.75	16.0	0.4	10.5
0811	8.7	8.7	24.0	11.5	1.75	16.0	0.4	12.0
1012	10.7	10.7	24.0	11.5	1.75	16.0	0.4	13.0 - 13.5



REEL



POLARITY



DIMENSIONS units (mm)

Size Code	W1±1.00	W2±1.00	Qty./Reel
0606	18.0	22.0	1000
0609	18.0	22.0	800
0809	26.0	30.0	600
0811	26.0	31.0	500
1012	26.0	31.0	400

RECOMMENDED LAND PATTERN DIMENSION OF PCB

Size Code	A (mm)	B (mm)	C (mm)
0606	1.9	3.5	1.6
0609	1.9	3.5	1.6
0809	3.1	4.2	2.2
0811	3.1	4.2	2.2
1012	4.5	4.4	2.2

