SMD Aluminum Electrolytic Capacitors

AEK Series



FEATURES

- Endurance, 105°C, 2000 (6.3 - 100V) - 3000 hours (160 - 400V)
- Designed for surface mounting on high density PC board
- RoHS Compliance and Halogen-free

LEAD-FREE
LEAD-FREE COMPATIBLE COMPONENT

APPLICATIONS

- Industrial
- Commercial DC/DC
- Energy Storage

RoHS COMPLIANT

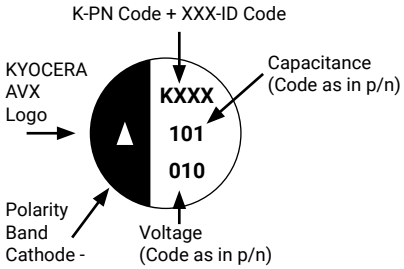
HOW TO ORDER

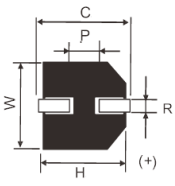
A	EK	0608	101	M	010	R	-
Product Type Aluminum	**Series Type**	**Case Size** See table below	**Capacitance Code** µF code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow)	**Tolerance** M = ±20%	**Rated DC Voltage** 006 = 6.3Vdc, 010 = 10Vdc, 016 = 16Vdc, 025 = 25Vdc, 035 = 35Vdc, 050 = 50Vdc, 063 = 63Vdc, 080 = 80Vdc, 100 = 100Vdc, 160 = 160Vdc, 200 = 200Vdc, 250 = 250Vdc, 400 = 400Vdc	**Packaging** R = 13" Reel (D ≥ 12.50mm) R = 15" Reel (D ≤ 10.00mm) (Material details available upon request)	**Special** No Code = std

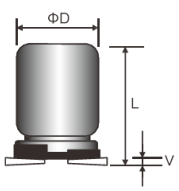
CASE DIMENSIONS millimeters (inches)

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)
0608	6.30 (0.248)	8.00 (0.315)	6.60 (0.260)	6.60 (0.260)	7.30 (0.287)	0.50 - 0.80 (0.020 - 0.031)	2.00 (0.080)	0.30 (0.012)	0.42
0610	6.30 (0.248)	10.50 (0.413)	6.60 (0.260)	6.60 (0.260)	7.30 (0.287)	0.50 - 0.80 (0.020 - 0.031)	2.00 (0.080)	0.30 (0.012)	0.50
0810	8.00 (0.315)	10.50 (0.413)	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)	0.83
0812	8.00 (0.315)	12.50 (0.492)	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)	0.90
0813	8.00 (0.315)	13.50 (0.531)	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)	0.91
0815	8.00 (0.315)	15.50 (0.610)	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)	0.95
1010	10.00 (0.394)	10.50 (0.413)	10.30 (0.406)	10.30 (0.406)	11.00 (0.433)	0.70 - 1.30 (0.028 - 0.051)	4.50 (0.177)	0.30 (0.012)	1.30
1012	10.00 (0.394)	12.50 (0.492)	10.30 (0.406)	10.30 (0.406)	11.00 (0.433)	0.70 - 1.30 (0.028 - 0.051)	4.50 (0.177)	0.30 (0.012)	1.33
1013	10.00 (0.394)	13.50 (0.531)	10.30 (0.406)	10.30 (0.406)	11.00 (0.433)	0.70 - 1.30 (0.028 - 0.051)	4.50 (0.177)	0.30 (0.012)	1.34
1016	10.00 (0.394)	16.50 (0.650)	10.30 (0.406)	10.30 (0.406)	11.00 (0.433)	0.70 - 1.30 (0.028 - 0.051)	4.50 (0.177)	0.30 (0.012)	2.00
1213	12.50 (0.492)	13.50 (0.531)	13.00 (0.512)	13.00 (0.512)	13.70 (0.539)	1.00 - 1.40 (0.039 - 0.055)	4.50 (0.177)	0.40 (0.016)	2.63
1216	12.50 (0.492)	16.00 (0.630)	13.00 (0.512)	13.00 (0.512)	13.70 (0.539)	1.00 - 1.40 (0.039 - 0.055)	4.50 (0.177)	0.40 (0.016)	3.02

MARKING







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SMD Aluminum Electrolytic Capacitors

AEK Series

TECHNICAL SPECIFICATIONS

Category Temperature Range:	-55ºC to + 105°C (6.3 - 100V), -40°C to +105°C (160 - 400V)		
Capacitance Range:	At 25°C,120Hz	1.0µF to 1000µF	
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	Rated voltage at 25°C*	6.3 - 100V	160 - 400V
		I ≦ 0.01CV or 3µA, whichever is greater (2min)	I ≦ 0.04CV + 100µA (1min)

* 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.

CAPACITANCE AND RATED VOLTAGE RANGE (FIGURE DENOTES CASE SIZE)

Capacitance		Rated Voltage DC (V_R)												
µF	**Code**	**6.3V**	**10V**	**16V**	**25V**	**35V**	**50V**	**63V**	**80V**	**100V**	**160V**	**200V**	**250V**	**400V**
1.0	1R0													0608*
1.5	1R5													0610
2.2	2R2												0608*	0610
3.3	3R3												0608*	0810
4.7	4R7												0810	0812
5.6	5R6													0812
6.8	6R8													0813
8.2	8R2													0815
10	100								0608	0608	1010	0810	0812	1013
15	150										0812	0813		1016
22	220						0608	0608	0810	0810	1012		1016	
33	330						0608	0810	0810	1010	1013			
47	470				0608	0608	0810	1010	1010	1010	1016			
100	101		0608	0608	0608	0810	1010	1010	1012	1213				
150	151			0608					1213					
220	221	0608	0608	0810	0810	1010		1213	1216					
330	331	0810	0810	0810	1010	1012	1216							
470	471		0810	1010	1012									
820	821		1010											
1000	102	1010												

Released ratings
* L dimensions (height) reduced to 7.70±0.50mm

RATINGS & PART NUMBER REFERENCE

Part No.	Case Size	Capacitance (µF)	Rated Voltage (V)	DF Max. (%)	ESR Max. @100kHz (Ω)	100kHz RMS Current (mA)	MSL
6.3 Volt							
AEK0608221M006R	0608	220	6.3	30	0.68	160	1
AEK0810331M006R	0810	330	6.3	40	0.3	340	1
AEK1010102M006R	1010	1000	6.3	40	0.28	860	1
10 Volt							
AEK0608101M010R	0608	100	10	24	0.68	175	1
AEK0608221M010R	0608	220	10	24	0.68	180	1
AEK0810331M010R	0810	330	10	30	0.3	340	1
AEK0810471M010R	0810	470	10	30	0.3	360	1
AEK1010821M010R	1010	820	10	30	0.28	860	1
16 Volt							
AEK0608101M016R	0608	100	16	20	0.68	175	1
AEK0608151M016R	0608	150	16	20	0.68	190	1
AEK0810221M016R	0810	220	16	26	0.3	500	1
AEK0810331M016R	0810	330	16	26	0.3	545	1
AEK1010471M016R	1010	470	16	26	0.28	800	1
25 Volt							
AEK0608470M025R	0608	47	25	16	0.68	180	1

All technical data relates to an ambient temperature of +25C. 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.
* L dimension (height) reduced to 7.70±0.50mm

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SMD Aluminum Electrolytic Capacitors

AEK Series

Part No.	Case Size	Capacitance (µF)	Rated Voltage (V)	DF Max. (%)	ESR Max. @100kHz (Ω)	100kHz RMS Current (mA)	MSL
AEK0608101M025R	0608	100	25	16	0.68	205	1
AEK0810221M025R	0810	220	25	16	0.3	550	1
AEK1010331M025R	1010	330	25	16	0.28	780	1
AEK1012471M025R	1012	470	25	16	0.15	875	1
35 Volt							
AEK0608470M035R	0608	47	35	14	0.68	210	1
AEK0810101M035R	0810	100	35	14	0.3	575	1
AEK1010221M035R	1010	220	35	14	0.28	835	1
AEK1012331M035R	1012	330	35	14	0.15	900	1
50 Volt							
AEK0608220M050R	0608	22	50	12	1.36	175	1
AEK0608330M050R	0608	33	50	12	1.36	180	1
AEK0810470M050R	0810	47	50	12	0.6	540	1
AEK1010101M050R	1010	100	50	12	0.45	700	1
AEK1216331M050R	1216	330	50	12	0.15	1180	1
63 Volt							
AEK0608220M063R	0608	22	63	12	4.2	150	1
AEK0810330M063R	0810	33	63	12	1.16	375	1
AEK0810470M063R	0810	47	63	12	1.16	450	1
AEK1010101M063R	1010	100	63	12	0.67	575	1
AEK1213221M063R	1213	220	63	12	0.28	890	1
80 Volt							
AEK0608100M080R	0608	10	80	12	4.8	140	1
AEK0810220M080R	0810	22	80	12	1.95	375	1
AEK0810330M080R	0810	33	80	12	1.95	450	1
AEK1010470M080R	1010	47	80	12	1.24	575	1
AEK1012101M080R	1012	100	80	12	1.24	600	1
AEK1213151M080R	1213	150	80	12	0.54	800	1
AEK1216221M080R	1216	220	80	12	0.46	960	1
100 Volt							
AEK0608100M100R	0608	10	100	12	5	135	1
AEK0810220M100R	0810	22	100	12	2.5	345	1
AEK1010330M100R	1010	33	100	12	1.6	560	1
AEK1010470M100R	1010	47	100	12	1.6	575	1
AEK1213101M100R	1213	100	100	12	0.65	680	1
160 Volt							
AEK1010100M160R	1010	10	160	15	16	90	1
AEK0812150M160R	0812	15	160	15	14	136	1
AEK1012220M160R	1012	22	160	15	12	170	1
AEK1013330M160R	1013	33	160	15	9	215	1
AEK1016470M160R	1016	47	160	15	8	380	1
200 Volt							
AEK0810100M200R	0810	10	200	15	16	110	1
AEK0813150M200R	0813	15	200	15	14	170	1
250 Volt							
AEK06082R2M250R*	0608	2.2	250	15	35	52	1
AEK06083R3M250R*	0608	3.3	250	15	32	68	1
AEK08104R7M250R	0810	4.7	250	15	20	96	1
AEK0812100M250R	0812	10	250	15	16	166	1
AEK1016220M250R	1016	22	250	15	12	300	1
400 Volt							
AEK06081R0M400R*	0608	1	400	20	78	28	1
AEK06101R5M400R	0610	1.5	400	20	75	36	1
AEK06102R2M400R	0610	2.2	400	20	35	44	1
AEK08103R3M400R	0810	3.3	400	20	32	64	1
AEK08124R7M400R	0812	4.7	400	20	26	78	1
AEK08125R6M400R	0812	5.6	400	20	24	96	1
AEK08136R8M400R	0813	6.8	400	20	22	108	1
AEK08158R2M400R	0815	8.2	400	20	20	130	1
AEK1013100M400R	1013	10	400	20	18	140	1
AEK1016150M400R	1016	15	400	20	16	174	1

All technical data relates to an ambient temperature of +25C. 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.
* L dimension (height) reduced to 7.70±0.50mm

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FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Rated Voltage (Vdc)	120 - 1K (Hz)	1K - 10K (Hz)	10K - 100K (Hz)	100K (Hz)
6.3 - 400	0.50	0.80	0.90	1.00

Internal heating produced by ripple current will reduce the lifetime of capacitors, at a rate of halving the lifetime with every 5℃ rise.
When long life performance is required in actual use the rms ripple current should be minimized.

QUALIFICATION TABLE

Test	AEK series (-55°C to + 105°C (6.3 - 100V), -40°C to +105°C (160 - 400V))								
	Condition	Characteristics							
Low Temperature Characteristics (Max. Impedance Ratio)	At 120Hz	Rated Voltage (V)	6.3	10	16	25	35 - 100	160 - 250	400
		Z(-25°C)/Z(+20°C)	4	3	2	2	2	6	6
		Z(-40°C)/Z(+20°C)	10	8	6	4	3	10	18
Endurance	The specifications shall be met when the capacitors are restored to 20°C after rated voltage is applied for a specified period of time at 105°C.	ΔC/C	≦ ± 20% of the initial limit						
		DF	≦ 200% of the initial specified limit						
		DCL	≦ the initial specified limit						
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after leaving them under no load at 105°C for 1,000 hours (6.3 - 100V: 500 hours).	ΔC/C	≦ ± 20% of the initial limit						
		DF	≦ 200% of the initial specified limit						
		DCL	≦ 200% of the initial specified limit						

Tested in accordance to AEC-Q200

REFLOW

Diameter (mm)	Φ6.3	Φ8	Φ10	Φ12.5
Peak Temperature	260°C, 5 sec. max.			
Preheat Temperature	100°C to 200°C, 180 sec. max.			100°C to 180°C, 150 sec. max.
Duration at 200°C or higher	90 sec. max.	90 sec. max.	60 sec. max.	60 sec. max.
Duration at 230°C or higher	40 sec. max.	30 sec. max.	30 sec. max.	30 sec. max.
Reflow Number	Twice* or less			

*if twice then need to be at least 2hrs between reflows

STORAGE

1. 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.
2. 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.
3. Shelf life

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

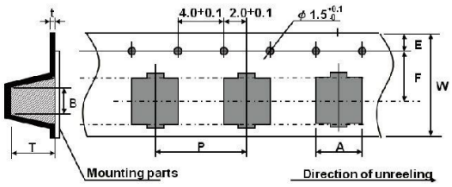
- Years from manufacturing date code.
- KYOCERA AVX does not guarantee or assume responsibility for product behavior after 3 years of storage.
- Ageing procedure should be performed as follows:
  - Connect the capacitor in series to a 1kΩ resistor, and apply half rated voltage for 2 hours.
  - After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

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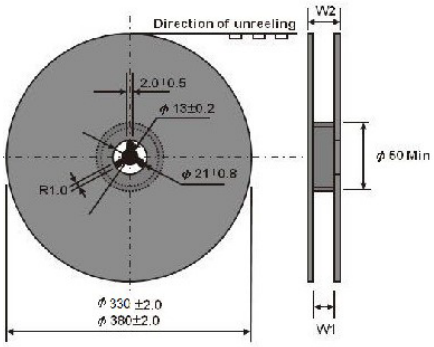
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PACKAGE TAPE DIMENSIONS units (mm)

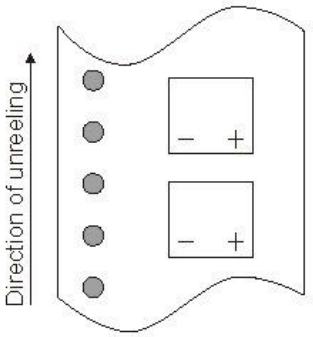
Size Code	A0±0.20	B0±0.20	W±0.30	F±0.10	E±0.10	P±0.10	t±0.10	T±0.05
0608	7.0	7.0	16.0	7.5	1.75	12.0	0.4	8.0
0610	7.0	7.0	16.0	7.5	1.75	12.0	0.4	11.0
0810	8.7	8.7	24.0	11.5	1.75	16.0	0.4	11.0
0812	8.7	8.7	24.0	11.5	1.75	16.0	0.4	13.0
0813	8.7	8.7	24.0	11.5	1.75	16.0	0.4	14.0
0815	8.7	8.7	24.0	11.5	1.75	16.0	0.4	16.0
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
1013	10.7	10.7	24.0	11.5	1.75	16.0	0.4	15.0
1016	10.7	10.7	24.0	11.5	1.75	16.0	0.4	17.5
1213	13.4	13.4	32.0	14.2	1.75	24.0	0.4	14.5
1216	13.4	13.4	32.0	14.2	1.75	24.0	0.4	16.5



REEL



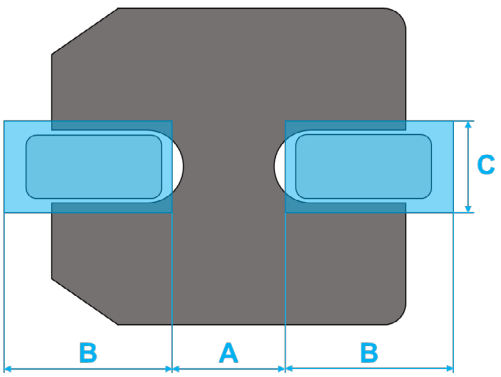
POLARITY



DIMENSIONS units (mm)

Size Code	W1±1.00	W2±1.00	Qty./Reel	Reel size (inch)
0608	18.0	22.0	1000	15
0610	18.0	22.0	1000	15
0810	18.0	22.0	550	15
0812	26.0	31.0	550	15
0813	26.0	31.0	550	15
0815	26.0	31.0	550	15
1010	26.0	31.0	550	15
1012	26.0	31.0	500	15
1013	26.0	31.0	450	15
1016	26.0	31.0	350	15
1213	34.0	39.0	200	13
1216	34.0	39.0	150	13

RECOMMENDED LAND PATTERN DIMENSION OF PCB



Size Code	A (mm)	B (mm)	C (mm)
0608	1.9	3.5	1.6
0610	1.9	3.5	1.6
0810	3.1	4.2	2.2
0812	3.1	4.2	2.2
0813	3.1	4.2	2.2
0815	3.1	4.2	2.2
1010	4.5	4.4	2.2
1012	4.5	4.4	2.2
1013	4.5	4.4	2.2
1016	4.5	4.4	2.2
1213	4.0	5.7	2.5
1216	4.0	5.7	2.5

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