

Data Sheet

Customer: _____

Product: Aluminum Electrolytic Capacitors – AEXR Series _____

AEC-Q200 version available

Size : 5x11mm ~ 22x40mm _____

Issued Date: 16-Oct-2023 _____

Edition: Ver.1 _____

Record of change

Date	Ver.	Description	Page
16-Oct-2023	1		

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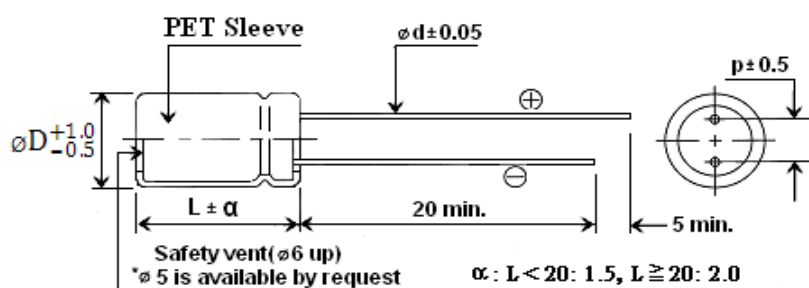
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Prepared by	Checked by	Approved by	Accepted by (customer)
16-Oct-2023	16-Oct-2023	16-Oct-2023	
<i>Hwa Wu</i>	<i>Andy Hsu</i>	<i>Arthur Su</i>	

- AEXR series capacitors are ideal for use in switching power supplies, communication equipments and etc.
- **Low Impedance** and long life.
- Safety vent construction design.
- RoHS Compliant
- AEC-Q200 version available

Characteristics

Voltage Range	6.3 to 100 VDC					160 to 450 VDC			
Capacitance Range	4.7 to 15000uF					1 to 470uF			
Temperature Range	-40 to +105°C					-25 to +105°C			
Leakage Current	I ≤ 0.01CV or 2uA, whichever is greater 3 minutes after Rated Voltage applied					I ≤ 0.03CV 3 minutes after Rated Voltage applied			
Capacitance Tolerance	±20% at 120Hz , 20°C(10% Tol. is available upon request)								
Dissipation Factor (at 20°C, 120Hz)	Working Voltage (V)	6.3	10	16	25	35	50	63	100
	tanδ(%) max	18	16	14	12	10	9	8	8
	Working Voltage (V)	160	200	250	350	400	450		
	tanδ(%) max	12	12	12	15	15	17		
Low Temperature Characteristics (120Hz)	For capacitance > 1000uF, add 0.02 for every 1000uF								
	Working Voltage (V)	6.3	10	16	25	35	50	63	100
	Z-25°C/Z +20°C	4	3	3	3	3	3	2	2
	Z-40°C/Z +20°C	8	6	4	3	3	3	3	3
	Working Voltage (V)	160	200	250	350	400	450		
	Z-25°C/Z +20°C	2	2	3	5	5	6		
	Z-40°C/Z +20°C	3	6	6	6	6	-		
	For capacitance > 1000uF, add 0.5 every 1000uF for -25°C/+20°C add 1.0 every 1000uF for -40°C/+20°C								
Load Life :		After the rated voltage with ripple current has been applied for at 105°C (100V~450V : 2000HRS)	Capacitance change			Within ±20% of initial value			
D φ	Life Hours		D.F. tanδ			200% or less of initial specified value			
5 – 6.3 φ	2000								
8 φ	3000								
≥ 10 φ		5000	Leakage current			Less than initial specified value			
Shelf life (at 105°C)		After storage for 1000 hours at 105°C with no voltage applied, the capacitor shall meet the specified limit in load life. Pre-treatment for measurement shall be conducted after application of DC working voltage for 30 minutes.							



Drawing

Dφ	5	6.3	8	10	13	16	18
p	2.0	2.5	3.5	5.0	5.0	7.5	7.5
dφ	0.5	0.5	0.5	0.6	0.6	0.8	0.8

Ripple Current Coefficients

Frequency (Hz)	50(60)	120	400	1K	10K	100K
Cap.(uF) / Hz	Multiplier					
Cap. ≤ 10	0.47	0.59	0.76	0.85	0.97	1
10 < Cap. ≤ 100	0.52	0.62	0.80	0.89	0.97	1
100 < Cap. ≤ 1000	0.58	0.72	0.84	0.90	0.98	1
1000 < Cap.	0.63	0.78	0.87	0.91	0.98	1

Case size & Maximum Ripple Current (mA rms 105°C 100KHz) & Imp. (Ω 20°C 100KHz)

WV Cap.	35			50			63			100		
uF	Size	Imp	RC	Size	Imp	RC	Size	Imp	RC	Size	Imp	RC
1				5x11	3.5	40	5x11	3.0	20	5x11	4.4	30
2.2				5x11	3.5	40	5x11	2.8	35	5x11	3.3	42
3.3				5x11	3.5	40	5x11	2.2	50	5x11	2.60	72
4.7				5x11	2.00	90	5x11	2.00	65	5x11	2.60	72
6.8				5x11	1.89	110	5x11	1.82	100	6.3x11	1.77	130
10	5x11	2.2	107	5x11	1.82	120	5x11	1.75	110	6.3x11	1.77	130
22	5x11	1.5	150	6.3x11	1.25	150	6.3x11	0.80	240	8x12	0.85	220
33	5x11	1.21	180	6.3x11	0.80	250	6.3x11	0.61	270	10x12.5 10x16	0.70 0.69	293 320
47	6.3x11	0.80	250	6.3x11	0.65	290	8x12	0.56	300	10x12.5 10x16	0.58 0.37	370 382
68	6.3x11	0.64	280	8x12	0.33	375	10x12.5	0.21	480	10x16 10x21	0.35 0.28	470 501
100	8x12	0.25	450	10x12.5	0.17	480	10x16 10x12.5	0.14 0.17	530 535	13x21	0.18	714
120										13x16 13x21	1.08 1.14	90 90
150	8x12	0.191	510	10x12.5	0.132	560	10x16	0.11	600	13x21 16x16	0.174 0.15	780 820
220	10x16 10x12.5	0.114 0.17	750 620	10x16	0.096	630	10x21	0.08	710	13x26 16x26	0.13 0.10	950 1282
270	10x12.5	0.17	620				13x21	0.055	1250	13x30	0.11	1120
330	10x16	0.079	1050	10x21	0.078	960	13x21 13x26	0.055 0.055	1250 1350	16x26 16x31.5	0.10 0.09	1440 1563
470	10x21	0.065	1200	13x21	0.055	1400	13x26	0.053	1620	16x31.5 18x32	0.09 0.076	1650 1907
560				13x21	0.049	1640	13x26	0.049	1680	18x36	0.068	2000
680	13x21	0.056	1570	13x26	0.044	1830	16x26 13x30	0.043 0.045	1950 2160	18x36 16x41	0.08 0.083	1790 1790
820	13x21	0.048	1700	13x30	0.039	2100	16x26	0.038	2150	18x36	0.071	1840
1000	13x26	0.042	1900	16x26	0.036	2300	16x31.5	0.034	2350	18x41	0.066	1930
1200	10x21	0.039	2130	13x26	0.036	2300	16x31.5	0.04	2560			
1500	16x26	0.026	2490	16x31.5	0.034	2650	18x36	0.031	2710	22x41	0.022	3720
1800	16x26	0.024	2520				18x41	0.03	3000			
2200	16x31.5	0.022	2550	18x36	0.032	3070	18x41	0.024	3600	25x50	0.046	4680
2700	13x35	0.02	2610									
3300	16x36	0.016	2650	18x41	0.025	3100	22x46	0.024	3950			
4700	18x41	0.010	3000	22x40	0.022	3720						

Case size & Maximum Ripple Current (mA rms 105°C 100KHz) & Imp. (Ω 20°C 100KHz)

WV Cap	160			200			250			350		
uF	Size	Imp	RC	Size	Imp	RC	Size	Imp	RC	Size	Imp	RC
1	6.3x11	7.85	45	6.3x11	7.76	45	6.3x11	6.54	50	8x12	6.35	58
2.2	6.3x11	5.21	55	6.3x11	5.18	55	8x12 6.3x11	4.12	72	8x12 10x12.5	5.3 4.02	75 86
3.3	8x12	4.31	70	8x12	4.25	71	8x12	3.85	75	10x12.5	3.8	90
4.7	8x12	4.16	72	8x12 10x12.5	5.0 4.12	78 85	8x12 10x12.5	3.50 2.95	85 100	10x21 10x12.5	6.70	130
10	10x12.5 10x16	3.00 2.69	126 140	8x12 10x16	3.75 2.95	115 132	10x12.5 10x16	3.10	160	10x21 13x21	4.65	200
22	10x16 10x21	1.30 2.10	185 205	10x16 10x21	1.80 1.51	186 205	10x16 10x21	1.52	185	13x21	2.60	220
33	13x21	1.30	260	10x21 13x21	1.30 0.80	280 330	13x21	1.45	310	13x26	1.78	290
47	10x21 13x21	1.65 1.38	276 320	13x21 13x26	1.275 1.10	360 400	13x21 13x26 10x26	1.20	405	16x26 16x31.5	1.51	430
68	13x26	0.62	450	13x26 16x26 16x21	0.60	540	13x26 16x26	0.38	490	16x31.5	1.10	475
100	16x26	0.47	540	16x26 16x31.5	0.435	820	16x26 16x31.5	0.315	675	18x36	0.70	513
150	16x31.5	0.43	710	16x36	0.23	860	16x36	0.24	750	18x45	0.50	590
220	16x36	0.256	820	18x36 18x41	0.525 0.19	1050 1090	18x41	0.28	910			
330	18x41	0.195	1180									

wv Cap	400			450		
uF	Size	Imp	RC	Size	Imp	RC
1	8x12	16.5	36	8x12	17.35	45
2.2	8x12 10x12.5	13.0 13.0	65 76	10x12.5 10x16	10.25	65
3.3	8x12 10x12.5	12.0 21.2	86 105	10x12.5 10x16	18.2	89
4.7	10x12.5 10x21	11.0 10.0	105 120	10x16 13x21	6.85	110
10	10x21 13x21	6.30 5.45	218 235	13x21 13x26	5.60 6.30	180 189
22	13x21 13x26	3.15 2.65	268 295	13x26	2.8	320
33	13x26 16x26	1.60 2.90	399 440	16x26	2.2	460
47	16x26 16x31.5	1.60 1.56	539 580	16x36	1.35	650
68	18x25 18x32	0.99 1.10	774 800	18x36	1.08	760
100	18x36 18x41	0.70 0.72	854 900	18x36 18x41	1.10 1.05	825 880
150	22x40	0.44	1180	22x40	0.48	998
180				25x40	0.4	1120
220	25x40	0.4	1340			

Part Numbering System

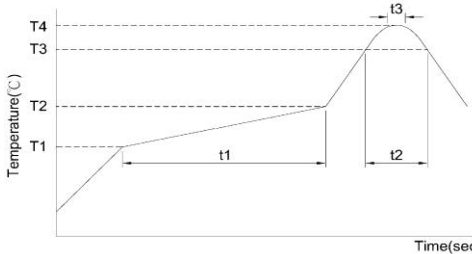
AEXR	101	M	25	A	—	T1
SERIES	CAPACITANCE	TOL.	W.V.	PACKAGE	SIZE	LEAD SPACE
AEC-Q200	IN 3DIGITS	M= ± 20%	0J= 6.3V	B= Bulk	Omit if only	Omit if Bulk
	010= 1.0uF		10= 10V	C5= Cut 5mm	one size	T1= L/S 2.5mm Taped
	4R7= 4.7 uF		16= 16V	AC5= Smaller Size cut 5mm	A= Smaller Size	TA= Lead forming space 5mm Taped
	101= 100uF		25= 25V			
	102= 1000uF		35= 35V	A= Ammo Pack		T35= L/S 3.5mm Taped
			50= 50V	R= Tape&Reel		T2=L/S 5mm Taped
			63= 63V	F5= Lead formed & cut 5mm		T3= L/S 7.5mm Taped
			2A= 100V			
			2C= 160V			
			2D= 200V			
			2E= 250V			
			2V= 350V			
			2G= 400V			
			2W= 450V			

Reliability for Car- Tronics

AEC Q-200_REV D

Endurance Characteristic:

No.	Item	Conditions	Specification		Reference	
1	High Temperature Load Life Test	Capacitor is placed in the highest temperature with rated voltage for 5000+72/-0Hrs.	Capacitance change	Within ±30% of initial value	MIL-STD-202 Method 108	
			Tanδ	Less than 300% of specified value		
			Leakage Current	Within specified value		
			Appearance	No abnormality		
2	High Temperature Exposure (Storage)	Capacitor is placed in the highest temperature for 1000+48/-0Hrs.	Capacitance change	Within ±30% of initial value	MIL-STD-202 Method1 08	
			Tanδ	Less than 300% of specified value		
			Leakage Current	Within specified value		
			Appearance	No abnormality		
3	Temperature Cycling	Step1: Max. rated temperature±3/-3°C(30±3mins) Step2: Min. rated temperature±3/-3°C(30±3mins) Max.transfer time: 1min According to the step1 to step2, and do 1000cycles	Capacitance change	Within ±10% of initial value	JESD22 Method JA-104	
			Tan δ	Within specified value		
			Leakage Current	Within specified value		
			Appearance	No abnormality		
4	Biased Humidity	Capacitor is placed at the temperature of 85±3°C, and humidity of 85% with rated voltage for 1000Hrs	Capacitance change	Within ±20% of initial value	MIL-STD-202 Method 103	
			Tanδ	Less than 150% of specified value		
			Leakage Current	Within specified value		
			Appearance	No abnormality		
5	Physical Dimension		Appearance	No abnormality	JESD22 Method JB-100	
6	Resistance To Solvent	1.The capacitor shall be immersed into the isopropyl. 2.Immersion time: 3 +0.5/-0 minutes at 25±5°C. 3.Use wool brush to brush capacitor for 10 times. Conduct the steps 1~3 for 3 cycles.	Print cannot fall off or ambiguous		MIL-STD-202 Method 215	
7	Mechanical Shock	Capacitor is placed on the PCB and fixed.Conditions as below:		Capacitance change	Within ±10% of initial value	MIL-STD-202 Method 213
		Test items	For automobile	Tanδ	Within specified value	
		Acceleration speed	100g(1000 m/s²)	Leakage Current	Within specified value	
		Shocking direction	X-Y-Z three axes (6 planes)	Appearance	No abnormality	
		Duration(D)(ms)	6			
		Velocity(m/s)	3.75			
		Wave	Half sine			
		Test times	18times (3*6=18)			
8	Vibration	Capacitor is placed in the PCB and fixed. Setting the acceleration (5g)and frequency (10-2000Hz) according to the test condition ,vibration 4Hrs from three directions (X-Y-Z).	Capacitance change	Within ±10% of initial value	MIL-STD-202 Method 204	
			Tan δ	Within specified value		
			Leakage Current	Within specified value		
			Appearance	No abnormality		

No.	Item	Conditions	Specification						Reference																																																																										
9	Resistance to Soldering Heat	According to the Control standard operating of Jarson, test twice.	Capacitance change		Within ±10% of initial value				MIL-ST D- 202 Method 210																																																																										
		Tanδ		Within specified value																																																																															
		Leakage Current		Within specified value																																																																															
		Appearance		No abnormality																																																																															
		<table><tr><td colspan="2">Rated voltage (V)</td><td colspan="2">4~50</td><td colspan="2">63 up</td><td colspan="2">4~100</td></tr><tr><td colspan="2">Case size (φ)</td><td colspan="2">4~6.3</td><td colspan="2">4~6.3</td><td colspan="2">8~12.5</td></tr><tr><td rowspan="2">Preheat</td><td colspan="2">Temp.(T1~T2,°C)</td><td colspan="6">150-180</td></tr><tr><td colspan="2">Time (t1)(Max,secs)</td><td colspan="6">100</td></tr><tr><td rowspan="2">Duration</td><td colspan="2">Temp.(T3,°C)</td><td>217</td><td>230</td><td>217</td><td>217</td><td>230</td></tr><tr><td colspan="2">Time (t2)(Max,secs)</td><td>90</td><td>60</td><td>60</td><td>60</td><td>40</td></tr><tr><td rowspan="2">Peak</td><td colspan="2">Temp.(T4,°C)</td><td colspan="2">260</td><td colspan="2">250</td><td colspan="2">250</td></tr><tr><td colspan="2">Time (t3,secs)</td><td colspan="6">5</td></tr><tr><td colspan="2">Reflow cycles</td><td colspan="6">2 or less</td></tr></table>								Rated voltage (V)		4~50		63 up		4~100		Case size (φ)		4~6.3		4~6.3		8~12.5		Preheat	Temp.(T1~T2,°C)		150-180						Time (t1)(Max,secs)		100						Duration	Temp.(T3,°C)		217	230	217	217	230	Time (t2)(Max,secs)		90	60	60	60	40	Peak	Temp.(T4,°C)		260		250		250		Time (t3,secs)		5						Reflow cycles		2 or less						
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10	Solderability test (SMD)	Solderability test 1: Solder bath temperature: 235±5°C Duration:5±0/-0.5s Solderability test 2:Solder bath temperature:260±5°C Duration:7±0.5s	Sn is more than 95% in the surface of terminal						J-STD-002B																																																																										
11	Electrical Characterization	Whether there is abnormality about electrical characterization in the test that under the ensurance temperature(the lowest ,the highest, atmospheric temperature).	Appearance: No abnormality						User Spec.																																																																										
12	Board Flex	Capacitor is placed in the PCB and pressed to deviate from Original fulcrum more than 2mm for 60 (+5) s.	Capacitance change	Within ±10% of initial value					AEC-Q 200-005																																																																										
			Tanδ	Within specified value																																																																															
			Leakage Current	Within specified value																																																																															
			Appearance	No abnormality																																																																															
13	Terminal Strength (SMD)	Test condition: Capacitor is placed in the PCB by solder paste and do high temperature test (Reflow) to endurance the power of 1.8kg for 60S,no dropping condition.	Capacitance change	Within ±10% of initial value					AEC-Q 200-006																																																																										
			Tanδ	Within specified value																																																																															
			Leakage Current	Within specified value																																																																															
			Appearance	No abnormality																																																																															
14	Surge Voltage	Capacitor is placed at 15°C~35°C with surge voltage for 30±5(charging) and 330s(discharging),do surge voltage test continuity for 1000 times. Applying voltage:	Capacitance change	Within ±20% of initial value					AEC-Q 200-007																																																																										
			Tanδ	Less than 175% of specified value																																																																															
			Leakage Current	Within specified value																																																																															
			Appearance	No abnormality																																																																															
			<table><tr><td>W.V.</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td></tr><tr><td>S.V.</td><td>7.3</td><td>11.5</td><td>18.4</td><td>28.8</td><td>40.3</td><td>57.5</td><td>72.5</td></tr><tr><td>W.V.</td><td>80</td><td>100</td><td>160</td><td>200</td><td>250</td><td>400</td><td>450</td></tr><tr><td>S.V.</td><td>92</td><td>115</td><td>184</td><td>230</td><td>288</td><td>440</td><td>495</td></tr></table>								W.V.	6.3	10	16	25	35	50	63	S.V.	7.3	11.5	18.4	28.8	40.3	57.5	72.5	W.V.	80	100	160	200	250	400	450	S.V.	92	115	184	230	288	440	495																																									
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