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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Prepared by	Checked by	Approved by	Accepted by (customer)
16-Oct-2023	16-Oct-2023	16-Oct-2023	
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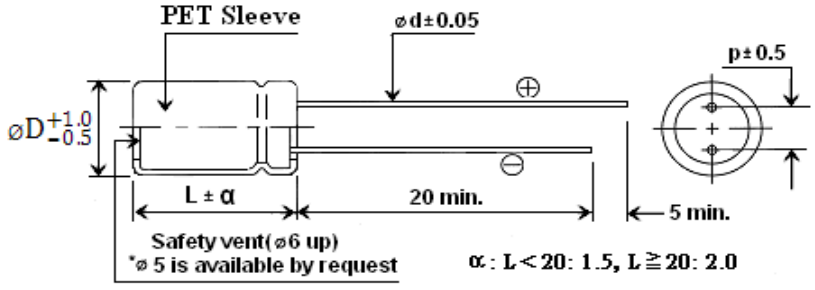
AEXR SERIES

- 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℃					-25 to +105℃			
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℃(10% Tol. is available upon request)								
Dissipation Factor (at 20℃, 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		
	For capacitance > 1000uF, add 0.02 for every 1000uF								
Low Temperature Characteristics (120Hz)	Working Voltage (V)	6.3	10	16	25	35	50	63	100
	Z-25℃/Z +20℃	4	3	3	3	3	3	2	2
	Z-40℃/Z +20℃	8	6	4	3	3	3	3	3
	Working Voltage (V)	160	200	250	350	400	450		
	Z-25℃/Z +20℃	2	2	3	5	5	6		
	Z-40℃/Z +20℃	3	6	6	6	6	-		
	For capacitance > 1000uF, add 0.5 every 1000uF for -25℃/+20℃ add 1.0 every 1000uF for -40℃/+20℃								
Load Life : **D ϕ / Life Hours** **5 – 6.3 ϕ / 2000** **8 ϕ / 3000** **≧ 10 ϕ / 5000** (100V～450V : 2000HRS)	After the rated voltage with ripple current has been applied for at 105℃	Capacitance change	Within ±20% of initial value						
		D.F. tanδ	200% or less of initial specified value						
		Leakage current	Less than initial specified value						
Shelf life (at 105℃)	After storage for 1000 hours at 105℃ 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

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AEXR SERIES

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

WV / Cap	6.3			10			16			25		
uF	Size	Imp	RC	Size	Imp	RC	Size	Imp	RC	Size	Imp	RC
10							5x11	4.70	74	5x11	2.56	85
22							5x11	2.60	100	5x11	1.95	115
33							5x11	2.00	114	5x11	1.42	155
47							5x11	1.10	155	5x11	1.10	155
68							5x11	0.69	195	6.3x11	0.65	230
100				5x11	0.80	210	6.3x11	0.50	265	6.3x11	0.35	370
150				6.3x11	0.61	290	8x12	0.41	370	8x12	0.31	390
220	6.3x11	0.65	310	6.3X11	0.35	340	8x12	0.25	450	8x12	0.15	555
330	8x12	0.42	390	8x12	0.27	460	8x12	0.15	590	8x14	0.12	700
470	8x12	0.25	450	8x12	0.25	580	10x12.5	0.12	750	10x16	0.076	1010
560							10x12.5	0.1	800	10x12.5	0.07	1105
680	8x14	0.21	550	8x14	0.11	765	10x16	0.080	850	10x21	0.065	1220
820	8x12.5	0.2	620	10x16	0.1	890	10x21	0.078	1180	10x21 13x26	0.052 0.055	1400 1960
1000	8x12 10x12.5	0.17 0.10	555 750	10x12.5 10x21	0.080 0.076	805 1040	10x21	0.068	1200	13x21	0.045	1650
1200	10x16	0.16	860	10x16	0.067	1200	10x21	0.061	1500	13x21	0.041	1980
1500	8x16 10x16	0.14 0.08	830 940	10x16 10x21	0.070 0.062	1000 1260	13x21	0.045	1575	13x26	0.038	1960
1800	10x16	0.11	1250	10x21	0.058	1550	13x21	0.047	1800	13x25	0.038	2210
2200	10x21	0.068	1050	10x21	0.052	1260	13x21	0.039	1900	16x26 13x26	0.036 0.044	2100 1860
3300	10x21 13x21	0.052 0.060	1260 1650	13x21	0.039	1660	16x26	0.030	1950	16x31.5	0.026	2680
3900				13x26	0.030	1720	16x26	0.030	2180			
4700	13x21	0.039	1900	13x26	0.030	1950	16x31.5	0.022	2410	18x36	0.018	2960
6800	16x26	0.032	2350	16x26	0.022	2150	16x36	0.018	2400	18x41	0.015	3550
10000	16x31.5	0.024	2700	16x31.5	0.018	2400	18x36	0.015	2800	22x41		
15000	18x36	0.023	2950									

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AEXR SERIES

Case size & Maximum Ripple Current (mA rms 105℃ 100KHz) & Imp. (Ω 20℃ 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	0.04	2530	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						

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AEXR SERIES

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

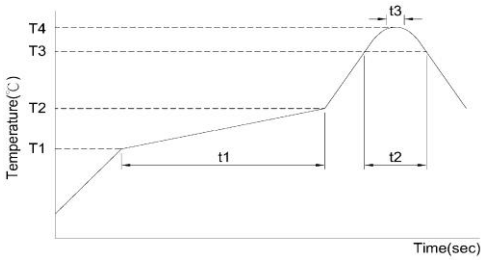
Reliability for Car- Tronics AEC Q-200_REV D

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 Method108
			Tanδ	Less than 300% of specified value	
			Leakage Current	Within specified value	
			Appearance	No abnormality	
3	Temperature Cycling	Step1: Max. rated temperature±3/-3℃(30±3mins) Step2: Min. rated temperature±3/-3℃(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℃, 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℃. 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
			Tanδ	Within specified value	
			Leakage Current	Within specified value	
			Appearance	No abnormality	

Test items	For automobile
Acceleration speed	100g(1000 m/s²)
Shocking direction	X-Y-Z three axles (6 planes)
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	

<table>
<tr><th>No.</th><th>Item</th><th>Conditions</th><th colspan="2">Specification</th><th>Reference</th></tr>
<tr><td>9</td><td>Resistance to Soldering Heat</td><td>According to the Control standard operating of Jarson, test twice.
 

<table>
<tr><td colspan="2">Rated voltage (V)</td><td colspan="2">4~50</td><td>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>4~6.3</td><td colspan="2">8~12.5</td></tr>
<tr><td rowspan="2">Preheat</td><td>Temp.(T1~T2,℃)</td><td colspan="5">150-180</td></tr>
<tr><td>Time (t1)(Max,secs)</td><td colspan="5">100</td></tr>
<tr><td rowspan="2">Duration</td><td>Temp.(T3,℃)</td><td>217</td><td>230</td><td>217</td><td>217</td><td>230</td></tr>
<tr><td>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>Temp.(T4,℃)</td><td colspan="2">260</td><td>250</td><td colspan="2">250</td></tr>
<tr><td>Time (t3,secs)</td><td colspan="5">5</td></tr>
<tr><td colspan="2">Reflow cycles</td><td colspan="5">2 or less</td></tr>
</table></td><td>Capacitance change</td><td>Within ±10% of initial value</td><td>MIL-STD- 202 Method 210</td></tr>
<tr><td></td><td></td><td></td><td>Tanδ</td><td>Within specified value</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Leakage Current</td><td>Within specified value</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Appearance</td><td>No abnormality</td><td></td></tr>
<tr><td>10</td><td>Solderability test (SMD)</td><td>Solderability test 1: Solder bath temperature: 235±5℃ Duration:5±0/-0.5s
Solderability test 2:Solder bath temperature:260±5℃ Duration:7±0.5s</td><td colspan="2">Sn is more than 95% in the surface of terminal</td><td>J-STD-002B</td></tr>
<tr><td>11</td><td>Electrical Characterization</td><td>Whether there is abnormality about electrical characterization in the test that under the ensurance temperature(the lowest ,the highest, atmospheric temperature).</td><td colspan="2">Appearance: No abnormality</td><td>User Spec.</td></tr>
<tr><td>12</td><td>Board Flex</td><td>Capacitor is placed in the PCB and pressed to deviate from Original fulcrum more than 2mm for 60（+5）s.</td><td>Capacitance change</td><td>Within ±10% of initial value</td><td>AEC-Q200-005</td></tr>
<tr><td></td><td></td><td></td><td>Tanδ</td><td>Within specified value</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Leakage Current</td><td>Within specified value</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Appearance</td><td>No abnormality</td><td></td></tr>
<tr><td>13</td><td>Terminal Strength (SMD)</td><td>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.</td><td>Capacitance change</td><td>Within ±10% of initial value</td><td>AEC-Q200-006</td></tr>
<tr><td></td><td></td><td></td><td>Tanδ</td><td>Within specified value</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Leakage Current</td><td>Within specified value</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Appearance</td><td>No abnormality</td><td></td></tr>
<tr><td>14</td><td>Surge Voltage</td><td>Capacitor is placed at 15℃~35℃ with surge voltage for 30±5(charging) and 330s(discharging),do surge voltage test continuity for 1000 times.
Applying voltage:
<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></td><td>Capacitance change</td><td>Within ±20% of initial value</td><td>AEC-Q200-007</td></tr>
<tr><td></td><td></td><td></td><td>Tanδ</td><td>Less than 175% of specified value</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Leakage Current</td><td>Within specified value</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Appearance</td><td>No abnormality</td><td></td></tr>
</table>