

## *Data Sheet*

Customer: \_\_\_\_\_

Product: Aluminum Electrolytic Capacitors – AEHR Series \_\_\_\_\_

AEC-Q200 version available

Size : 5x11mm ~ 22x41mm \_\_\_\_\_

Issued Date: 16-Oct-2023 \_\_\_\_\_

Edition: Ver. 1 \_\_\_\_\_

### Record of change

Date	Ver.	Description	Page
16-Oct-2023	1		

### **HITANO ENTERPRISE CORP.**

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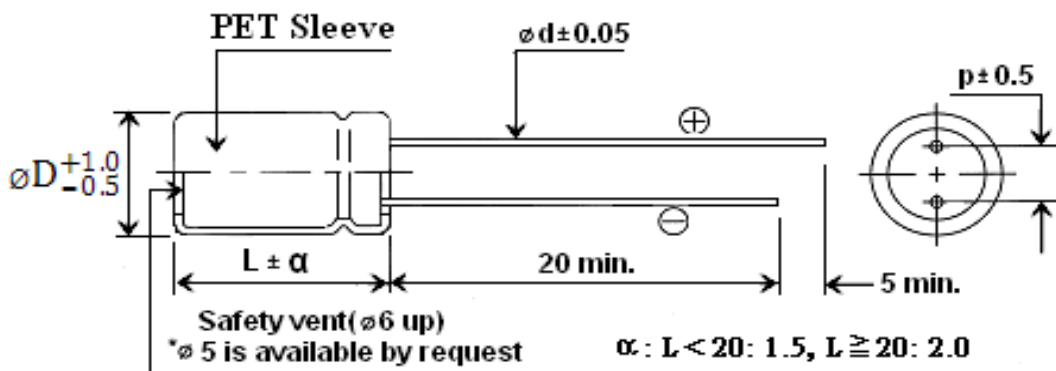
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Prepared by	Checked by	Approved by	Accepted by (customer)
16-Oct-2023	16-Oct-2023	16-Oct-2023	
<i>Andy Hsu</i>	<i>Hwa Wu</i>	<i>Hwa Wu</i>	

- High Temperature Radial Type, 105°C, 2000 hours assured Load Life.
- Applications: Communications equipment, switching regulators, and industrial applications.
- AEC-Q200 version available

**Characteristics**

<b>Voltage Range</b>	6.3 to 100 VDC				160 to 450 VDC			
<b>Capacitance Range</b>	0.47 to 10000uF				0.47 to 220uF			
<b>Temperature Range</b>	-40 to +105°C				-25 to +105°C			
<b>Capacitance Tolerance</b>	±20% at 120Hz, 20°C( 10% Tol. is available upon request)							
<b>Leakage Current</b>	I≤0.01CV or 3uA, whichever is greater 2 minutes after Rated Voltage applied				I≤0.03CV +20uA, whichever is greater 2 minutes after Rated Voltage applied			
<b>Dissipation Factor</b>	Rated Voltage (V)	6.3	10	16	25	35	50	63
	Dissipation Factor( tanδ)max	0.22	0.20	0.16	0.14	0.12	0.10	0.09
	Rated Voltage (V)	100	160	200	250	350	400	450
	Dissipation Factor( tanδ)max	0.08	0.12	0.14	0.17	0.20	0.25	0.25
	For capacitance > 1000uF, add 0.02 for every 1000uF, (at 20°C, 120Hz)							
<b>Stability at Low Temperature</b> (Impedance ratio at 120Hz) (For Cap. > 1000uF, add 0.5 per 1000uF(-25°C/+20°C) add 1.0 per 1000uF(-40°C/+20°C)	Rated Voltage (V)	6.3	10	16	25	35	50	63
	Z-25°C/Z 20°C	4	3	2	2	2	2	2
	Z-40°C/Z 20°C	8	6	4	3	3	3	3
	Rated Voltage (V)	160	200	250	350	400	450	
	Z-25°C/Z 20°C	2	2	3	5	6	6	
<b>Load Life</b>	After the rated voltage has been applied for 2000 hours at 105°C	Capacitance change	Within ±20% of initial value					
		D.F. tanδ	200% or less of initial specified value					
		Leakage current	Less than initial specified value					
<b>Shelf Life</b>	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**

<b>Dφ</b>	5	6.3	8	10	13	16	18	22
<b>p</b>	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10
<b>dφ</b>	0.5	0.5	0.5	0.6	0.6	0.8	0.8	0.8

**Ripple Current Coefficients**

<b>Frequency (Hz)</b>	<b>50(60)</b>	<b>120</b>	<b>400</b>	<b>1K</b>	<b>10K</b>	<b>100K</b>
<b>Cap.(uF) / Hz</b>	<b>Multiplier</b>					
<b>Cap. ≤ 10</b>	0.8	1	1.30	1.45	1.65	1.70
<b>10 &lt; Cap. ≤ 100</b>	0.8	1	1.23	1.36	1.48	1.53
<b>100 &lt; Cap. ≤ 1000</b>	0.8	1	1.16	1.25	1.35	1.38
<b>1000 &lt; Cap.</b>	0.8	1	1.11	1.17	1.25	1.28



**Case Size & Maximum Ripple Current ( mA rms 105°C 120Hz)**

Cap. wv	100V(2A)		160V(2C)		200V(2D)		250V(2E)		350V(2V)		400V(2G)		450V(2W)		
	uF	Size	R.C.	Size	R.C.	Size	R.C.	Size	R.C.	Size	R.C.	Size	R.C.	Size	R.C.
0.47	5x11		10	5x11	12	5x11	12	5x11	12	6.3x11	13	6.3x11	14	6.3x11	14
1	5x11		15	5x11 6.3x11	17 19	6.3x11	17	6.3x11	17	6.3x11	20	6.3x11 8x12	17 20	8x12	20
2.2	5x11		23	6.3x11	25	6.3x11	25	6.3x11 8x12	20 25	8x12	31	8x12 10x13	35 40	8x12 10x13	30 35
3.3	5x11		32	6.3x11	32	6.3x11 8x12	33 35	8x12	42	8x12 10x13	46 50	8x12 10x13	36 41	8x12 10x13 10x16	32 38 42
4.7	5x11		37	6.3x11 8x12	38 42	6.3x11 8x12	42 50	8x12 10x13	46 50	8x12 10x13	47 52	10x13 10x16	55 65	10x16 10x21	50 60
6.8	6.3x11		47	8x12	56	8x12 10x13	60 63	8x12 10x13	60 70	10x13	79	10x16	84	10x16 10x21	65 72
10	6.3x11		56	8x12 10x13	63 75	8x12 10x13	78 85	10x16	64	10x16 10x21	87 79	10x21 13x21 10x12.5	111 125 104	13x21 13x26	80 87
22	6.3x11 8x12		75 96	10x13 10x16	95 105	10x16 10x21	105 130	10x21 13x21	110 140	13x21 13x26	130 160	13x26 16x26	160 190	16x26 16x31.5	165 200
33	8x12 10x13		140 155	10x16 10x21	155 170	10x21 13x21	180 190	13x21	190	13x26 16x26	200 220	13x26 16x26	220 235	16x31.5 16x36	210 230
47	10x13 10x16		160 170	10x21 13x21	180 210	13x21 13x26	165 220	13x26 16x26	220 240	16x26 16x31.5	245 260	16x31.5 16x36	250 275	16x36 18x31.5	260 290
68	10x16		240	13x21 13x26	260 280	13x21 13x26	270 300	13x26 16x26	310 355	16x31.5	370	16x31.5 16x36	450 480	18x31.5 18x36	460 470
100	10x21 13x21		245 280	13x26 16x26	310 330	13x26 16x26	320 345	16x26 16x31.5	365 395	18x31.5 18x36	375 390	18x31.5 18x36	530 550	18x36 18x41	525 560
150	13x21 13x26		340 360	16x26	470	16x26 16x31.5	440 480	16x36 18x31.5	460 460	18x41	420	18x36 18x41	610 650	22x41	650
220	13x26 16x26		450 520	16x31.5 16x36	560 580	18x36 18x31.5	670 690	18x36 22x41	650 700						
330	13x21 13x26 16x26		874 660 690	18x31.5 18x36	660 700	18x31.5 18x36	750 810	18X45 25X30	720 800						
470	16x26 16x31.5		820 860	18x36 18x41	810 860	18x41 22x41	840 925								
680	16x36 18x31.5		920 950												
1000	18x41		1200												

**Part Numbering System**

<b>AEHR</b>	<b>101</b>	<b>M</b>	<b>25</b>	<b>A</b>	<b>-</b>	<b>T1</b>
<b>SERIES</b>	<b>CAPACITANCE</b>	<b>TOL.</b>	<b>W.V.</b>	<b>PACKAGE</b>	<b>SIZE</b>	<b>LEAD SPACE</b>
	IN 3DIGITS	M= ± 20%	0J= 6.3V	B= Bulk	Omit if only	Omit if Bulk
	010= 1.0uF		16= 16V	C5= Cut 5mm	one size	T1= L/S 2.5mm Taped
	4R7= 4.7 uF		63= 63V	AC5= Smaller Size cut 5mm	A= Smaller Size	TA= Lead forming space 5mm Taped
	101= 100uF		2A=100V			
	102= 1000uF		(Refer to voltage code in table)	A= Ammo Pack		T35= L/S 3.5mm Taped
	103= 10000uF			R= Tape&Reel		T2=L/S 5mm Taped
				F5= Lead formed & cut 5mm		T3= L/S 7.5mm Taped

**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 $\pm 30\%$ of initial value	MIL-STD-202 Method 108	
			Tan $\delta$	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 $\pm 30\%$ of initial value	MIL-STD-202 Method 108	
			Tan $\delta$	Less than 300% of specified value		
			Leakage Current	Within specified value		
			Appearance	No abnormality		
3	Temperature Cycling	Step1: Max. rated temperature $\pm 3/-3^{\circ}\text{C}$ (30 $\pm$ 3mins) Step2: Min. rated temperature $\pm 3/-3^{\circ}\text{C}$ (30 $\pm$ 3mins) Max.transfer time: 1min According to the step1 to step2, and do 1000cycles	Capacitance change	Within $\pm 10\%$ of initial value	JESD22 Method JA-104	
			Tan $\delta$	Within specified value		
			Leakage Current	Within specified value		
			Appearance	No abnormality		
4	Biased Humidity	Capacitor is placed at the temperature of 85 $\pm 3^{\circ}\text{C}$ , and humidity of 85% with rated voltage for 1000Hrs	Capacitance change	Within $\pm 20\%$ of initial value	MIL-STD-202 Method 103	
			Tan $\delta$	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 $\pm 5^{\circ}\text{C}$ . 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 $\pm 10\%$ of initial value	MIL-STD-202 Method 213
		Test items	For automobile	Tan $\delta$	Within specified value	
		Acceleration speed	100g(1000 m/s <sup>2</sup> )	Leakage Current	Within specified value	
		Shocking direction	X-Y-Z three axles (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 $\pm 10\%$ of initial value	MIL-STD-202 Method 204	
			Tan $\delta$	Within specified value		
			Leakage Current	Within specified value		
			Appearance	No abnormality		

No.	Item	Conditions	Specification	Reference																																										
9	Resistance to Soldering Heat	<p>According to the Control standard operating of Jarson, test twice.</p>	<table border="1"> <tr> <td>Capacitance change</td> <td>Within ±10% of initial value</td> </tr> <tr> <td>Tanδ</td> <td>Within specified value</td> </tr> <tr> <td>Leakage Current</td> <td>Within specified value</td> </tr> <tr> <td>Appearance</td> <td>No abnormality</td> </tr> </table>	Capacitance change	Within ±10% of initial value	Tanδ	Within specified value	Leakage Current	Within specified value	Appearance	No abnormality	MIL-STD-202 Method 210																																		
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<table border="1"> <tr> <td colspan="2">Rated voltage (V)</td> <td>4~50</td> <td>63 up</td> <td>4~100</td> </tr> <tr> <td colspan="2">Case size (φ)</td> <td>4~6.3</td> <td>4~6.3</td> <td>8~12.5</td> </tr> <tr> <td rowspan="2">Preheat</td> <td>Temp.(T1~T2,°C)</td> <td colspan="3">150-180</td> </tr> <tr> <td>Time (t1)(Max,secs)</td> <td colspan="3">100</td> </tr> <tr> <td rowspan="2">Duration</td> <td>Temp.(T3,°C)</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,°C)</td> <td>260</td> <td>250</td> <td>250</td> </tr> <tr> <td>Time (t3,secs)</td> <td colspan="3">5</td> </tr> <tr> <td colspan="2">Reflow cycles</td> <td colspan="3">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)	<p>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</p>	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.	<table border="1"> <tr> <td>Capacitance change</td> <td>Within ±10% of initial value</td> </tr> <tr> <td>Tanδ</td> <td>Within specified value</td> </tr> <tr> <td>Leakage Current</td> <td>Within specified value</td> </tr> <tr> <td>Appearance</td> <td>No abnormality</td> </tr> </table>	Capacitance change	Within ±10% of initial value	Tanδ	Within specified value	Leakage Current	Within specified value	Appearance	No abnormality	AEC-Q 200-005																																		
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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.	<table border="1"> <tr> <td>Capacitance change</td> <td>Within ±10% of initial value</td> </tr> <tr> <td>Tanδ</td> <td>Within specified value</td> </tr> <tr> <td>Leakage Current</td> <td>Within specified value</td> </tr> <tr> <td>Appearance</td> <td>No abnormality</td> </tr> </table>	Capacitance change	Within ±10% of initial value	Tanδ	Within specified value	Leakage Current	Within specified value	Appearance	No abnormality	AEC-Q 200-006																																		
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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:	<table border="1"> <tr> <td>Capacitance change</td> <td>Within ±20% of initial value</td> </tr> <tr> <td>Tanδ</td> <td>Less than 175% of specified value</td> </tr> <tr> <td>Leakage Current</td> <td>Within specified value</td> </tr> <tr> <td>Appearance</td> <td>No abnormality</td> </tr> </table>	Capacitance change	Within ±20% of initial value	Tanδ	Less than 175% of specified value	Leakage Current	Within specified value	Appearance	No abnormality	AEC-Q 200-007																																		
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