

## *Data Sheet*

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

Product: Aluminum Electrolytic Capacitors – AEFH Series

Load life 4000~10,000 hrs at 105°C AEC-Q200 version available

Size : 5x11mm ~ 18x41mm \_\_\_\_\_

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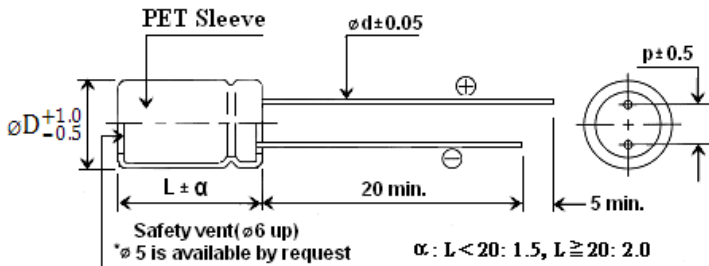
Prepared by	Checked by	Approved by	Accepted by (customer)
16-Oct-2023	16-Oct-2023	16-Oct-2023	
<i>Andy Hsu</i>	<i>Hwa Wu</i>	<i>Hwa Wu</i>	

- Used in electronic ballast, switching power supply, industrial measuring instruments.
- Higher ripple current with minimized ESR.
- Load life 4000~10000 Hrs at 105°C
- RoHs compliant, non solvent proof, 6.3-100VDC newly type..
- AEC-Q200 version available

**Characteristics**

<b>Voltage Range</b>	6.3 ~ 100VDC																					
<b>Capacitance Range</b>	22 ~ 4700uF																					
<b>Temperature Range</b>	-40 ~ +105°C																					
<b>Leakage Current</b>	I = 0.01CV or 3uA (After 2 minutes) with rated working voltage applied.																					
<b>Capacitance Tolerance</b>	±20% at 120Hz , 20°C( 10% Tol. is available upon request)																					
<b>Dissipation Factor</b>	Working Voltage (V)	6.3	10	16	25	35	50	63	100													
	tanδ(%) max	22	19	16	14	12	10	9	9													
For capacitance > 1000uF, add 2% per another 1,000uF																						
<b>Low Temperature Characteristic (120Hz)</b>	Working Voltage (V)	6.3	10	16	25	35	50	63	100													
	Z-25°C/Z +20°C	4	3	2	2	2	2	2	2													
	Z-40°C/Z +20°C	8	6	4	3	3	3	3	3													
<b>Load life :</b>	Test conditions			<table border="1"> <tr> <td>Size</td> <td>ΦD ≤ 6.3</td> <td>ΦD=8,10</td> <td>ΦD ≥ 13</td> </tr> <tr> <td rowspan="2">Voltage</td> <td>6.3-10V</td> <td>4000hrs</td> <td>6000hrs</td> <td>8000hrs</td> </tr> <tr> <td>16-100V</td> <td>5000hrs</td> <td>7000hrs</td> <td>10000hrs</td> </tr> </table>						Size	ΦD ≤ 6.3	ΦD=8,10	ΦD ≥ 13	Voltage	6.3-10V	4000hrs	6000hrs	8000hrs	16-100V	5000hrs	7000hrs	10000hrs
	Size	ΦD ≤ 6.3	ΦD=8,10	ΦD ≥ 13																		
Voltage	6.3-10V	4000hrs	6000hrs	8000hrs																		
	16-100V	5000hrs	7000hrs	10000hrs																		
Duration time : as right				Ambient temperature : +105°C																		
Applied voltage : Rated DC working voltage				After test requirement at +20°C																		
Capacitance change: ≤ ±25% of the initial measured				Dissipation factor : ≤ 200% of the initial specified																		
Leakage current : ≤ The initial specified value																						
<b>Shelf life (at 105°C)</b>	Test conditions			Duration time : 1000Hrs																		
	Ambient temperature : +105°C			Applied voltage : None																		
	After test requirement at +20°C: Same limits as Load life.			Pre-treatment for measurements 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	0.6	0.8	0.8
			L < 20/L ≥ 20				

**Ripple Current Coefficients**

Cap(uF)//Hz	50(60)	120	400	1K	10K	100K
Cap ≤ 10	0.47	0.59	0.76	0.85	0.97	1.00
10 < Cap ≤ 100	0.52	0.62	0.80	0.89	0.97	1.00
100 < Cap ≤ 1000	0.58	0.72	0.84	0.90	0.98	1.00
1000 < Cap	0.63	0.78	0.87	0.91	0.98	1.00

**Dimensions, Maximum Permissible Ripple Current & Impedance**

WV Cap(μF)	6.3				10			
	Size	Ripple	Impedance		Size	Ripple	Impedance	
			20°C	-10°C			20°C	-10°C
100					5x11	215	0.580	2.300
150	5x11	190	0.550	2.300				
220	6.3x11	290	0.260	0.900	6.3x11	340	0.230	0.870
330	6.3x11	330	0.210	0.870	6.3x11	380	0.220	0.870
470	8x11.5	425	0.140	0.580	8x11.5	600	0.130	0.520
680	8x11.5	520	0.130	0.520	8x16	770	0.096	0.350
					10x12.5	800	0.085	0.310
820	8x16	800	0.090	0.320	10x16	920	0.075	0.280
1000	8x20	850	0.080	0.350	8x20	1050	0.072	0.270
					10x16	1110	0.064	0.240
1200	8x20	1000	0.075	0.260	10x20	1380	0.045	0.180
	10x16	1020	0.064	0.240				
1500	10x20	1340	0.050	0.180	10x25	1550	0.043	0.170
2200	10x25	1550	0.046	0.170	13x20	1800	0.035	0.120
3300	13x20	1720	0.038	0.120	13x25	2120	0.029	0.089
4700	13x30	2400	0.027	0.078				

WV Cap(μF)	16				25			
	Size	Ripple	Impedance		Size	Ripple	Impedance	
			20°C	-10°C			20°C	-10°C
47					5x11	160	0.560	2.300
100	6.3x11	280	0.220	0.820	6.3x11	350	0.250	0.870
120	6.3x11	310	0.215	0.870				
220	8x11.5	480	0.180	0.850	8x11.5	590	0.150	0.520
330	8x11.5	600	0.140	0.520	8x16	810	0.092	0.350
					10x12.5	826	0.082	0.320
470	8x16	780	0.095	0.350	8x20	1020	0.074	0.270
	10x12.5	800	0.085	0.320	10x16	1210	0.068	0.240
680	8x20	1000	0.080	0.270	10x20	1400	0.050	0.180
820	10x20	1280	0.052	0.220	10x25	1580	0.041	0.170
1000	10x20	1380	0.046	0.180	10x30	1820	0.032	0.120
	13x16	1420	0.050	0.160	13x20	1800	0.036	0.120
1200	10x25	1560	0.044	0.170				
1500	13x20	1720	0.037	0.120	13x25	2240	0.028	0.089
1800	13x25	2030	0.030	0.095	13x30	2640	0.024	0.078
2200	13x25	2200	0.026	0.089	13x35	2880	0.023	0.065
2700	13x30	2600	0.023	0.077	16x25	2820	0.022	0.060
3300	13x35	2800	0.022	0.066				
4700	18x25	3000	0.020	0.049				

**Dimensions, Maximum Permissible Ripple Current & Impedance**

WV Cap(μF)	35				50			
	Size	Ripple	Impedance		Size	Ripple	Impedance	
			20°C	-10°C			20°C	-10°C
22					5x11	220	0.650	2.800
33	5x11	230	0.550	2.300				
47	5x11	280	0.450	1.800	6.3x11	260	0.370	1.500
100	6.3x11	450	0.180	0.720	8x11.5	680	0.160	0.670
120					8x16	760	0.120	0.480
150	8x11.5	680	0.140	0.520	10x12.5	800	0.120	0.480
180					8x20	1000	0.090	0.360
220	8x16	1000	0.090	0.350	10x16	1300	0.082	0.340
	10x12.5	1060	0.080	0.320				
270	8x20	1180	0.070	0.260	10x20	1350	0.060	0.240
330	10x16	1380	0.062	0.240	10x25	1600	0.057	0.220
470	10x20	1800	0.048	0.180	10x30	1800	0.048	0.170
560	10x25	1900	0.042	0.160	13x25	1950	0.042	0.110
680	10x30	2000	0.035	0.120				
	13x20	2100	0.034	0.120				
1000	13x25	2400	0.028	0.088	16x25	2600	0.033	0.100
1200	16x21	2800	0.028	0.078	16x31.5	2870	0.030	0.066
1500	13x35	3000	0.022	0.065	16x35.5	3020	0.025	0.050
1800	16x25	2850	0.020	0.060				
2200	18x25	2880	0.019	0.057				
2700	18x31.5	3850	0.016	0.040				

**Dimensions, Maximum Permissible Ripple Current & Impedance**

WV Cap(μF)	63				100			
	Size	Ripple	Impedance		Size	Ripple	Impedance	
			20°C	-10°C			20°C	-10°C
33	6.3x11	260	1.200	5.00				
47	8x11.5	360	0.660	3.10	10x12.5	400	0.42	1.80
68					10x16	460	0.300	1.50
82	8x16	460	0.440	2.10	10x20	600	0.210	0.94
	10x12.5	500	0.430	1.80				
100	10x12.5	640	0.340	1.80	10x25	800	0.200	0.84
120	8x20	700	0.320	1.60	13x20	900	0.160	0.64
	10x16	760	0.300	1.50				
180	10x20	880	0.190	0.94				
220	10x25	1100	0.185	0.84	13x25	1430	0.080	0.32
270	13x20	1200	0.160	0.64	16x25	1480	0.073	0.27
330	13x25	1600	0.120	0.45	13x40	1600	0.071	0.30
390					16x31.5	1700	0.055	0.20
					18x25	1740	0.054	0.21
470	13x30	1800	0.100	0.42	16x35.5	1880	0.047	0.17
					18x31.5	1600	0.047	0.17
560	16x25	2000	0.073	0.27				
680	13x40	2200	0.070	0.30	18x35.5	1720	0.042	0.15
820	16x31.5	2400	0.054	0.20	18x41	2340	0.040	0.15
1000	16x35.5	2500	0.048	0.17				
	18x31.5	2800	0.047	0.17				
1200	16x41	2920	0.040	0.15				
	18x35.5	3000	0.039	0.15				
1500	18x41	3200	0.036	0.13				

**Ripple Current (mA, rms ) at 105°C 100KHz**

**Part Numbering System**

AEFH    □ □ □    □    □ □    **B**    □ □  
 Series    Capacitance    Tolerance    Rated Voltage    Package    Extended Code

**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 Method108	
			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	According to the Control standard operating of Jarson, test twice.	Capacitance change	Within ±10% of initial value	MIL-STD-202 Method 210																																									
			Tanδ	Within specified value																																										
			Leakage Current	Within specified value																																										
		Appearance	No abnormality																																											
		<table border="1"> <tr> <td>Rated voltage (V)</td> <td>4~50</td> <td>63 up</td> <td>4~100</td> </tr> <tr> <td>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="2">150-180</td> </tr> <tr> <td>Time (t1)(Max,secs)</td> <td colspan="2">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>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			
		Rated voltage (V)	4~50	63 up		4~100																																								
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	Time (t3,secs)	5																																												
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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 endurance 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																																										
			<table border="1"> <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	Leakage Current	Within specified value							
			W.V.	6.3		10	16	25	35	50	63																																			
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