

## *Data Sheet*

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

Product: Aluminum Electrolytic Capacitors – AEFL Series

Load life 8000~10,000 hrs at 105°C AEC-Q200 version available

Size : 8x11.5mm ~ 18x45mm

Issued Date: 16-Oct-2023

Edition: Ver. 1

### Record of change

Date	Ver.	Description	Page
16-Oct-2023	1		

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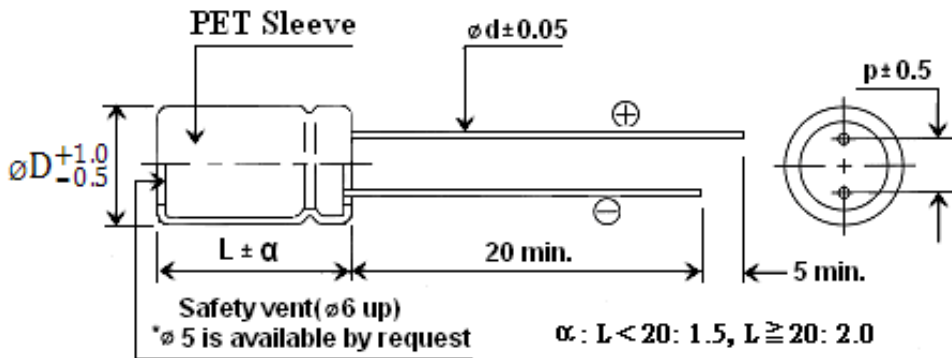
Prepared by	Checked by	Approved by	Accepted by (customer)
16-Oct-2023	16-Oct-2023	16-Oct-2023	
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- EFL series capacitors are suitable for electronic ballast and energy saving lamp..
- Load life 105°C, 8000 ~ 10000 hours assured.
- AEC-Q200 version available

**Characteristics**

<b>Voltage Range</b>	160 ~450V												
<b>Temperature Range</b>	-40 ~ + 105°C												
<b>Capacitance Range</b>	0.1 to 330 uF												
<b>Leakage Current</b>	I ≤ 0.04CV+100uA, whichever is greater (After 1 minutes)												
<b>Capacitance Tolerance</b>	±20% at 120Hz, 20°C( 10% Tol. is available upon request)												
<b>Dissipation Factor</b>	W.V.	160	200	250	350	400	450						
	tanδ	0.10	0.10	0.10	0.12	0.12	0.12						
<b>Low Temperature Characteristics (120Hz)</b>	W.V.	160	200	250	350	400	450						
	Z-25°C / Z+20°C	3	3	3	5	5	6						
	Z-40°C / Z+20°C	6	6	6	6	6	8						
<b>Load life</b>	Test condition Duration time :As right Ambient temperature :+105°C Applied voltage :Rated DC working voltage After test requirement at +20°C Capacitance change: ≤ ±20% of the initial measured value Dissipation factor: ≤ 200% of the initial specified value Leakage current : ≤ The initial specified value						<table border="1"> <tr> <th>φ (mm)</th> <th>Life(hrs)</th> </tr> <tr> <td>8</td> <td>8000</td> </tr> <tr> <td>≥ 10</td> <td>10000</td> </tr> </table> For standard size	φ (mm)	Life(hrs)	8	8000	≥ 10	10000
	φ (mm)	Life(hrs)											
8	8000												
≥ 10	10000												
<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**



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

**Ripple Current Coefficients**

<b>Frequency(Hz)</b>	120	1K	10K	≥100K
<b>Multiplier</b>	0.50	0.80	0.85	1.0

**Multiplier for R.C. vs Temperature**

<b>Temp.(°C)</b>	45	60	70	85	95	105
<b>Multiplier.</b>	2.10	1.90	1.65	1.40	1.25	1.00

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

WV Cap(μF)	160		200		250		350		400		450	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
1.0							8X11.5	80	10X12.5	85	10X12.5	90
2.2							10X12.5	85	10X12.5	90	10X12.5	95
3.3					8X11.5	80	10X12.5	90	10X16	100	10X16	110
4.7					10X12.5	105	10X16	105	10X20	115	10X20	125
6.8			10X12.5	105	10X12.5	110	10X16	115	10X20	125	10X20	135
10	10X16	125	10X16	125	10X16	140	10X20	150	13X20	170	13X20	185
22	10X20	200	10X20	200	13X20	200	13X20	260	13X25	270	16X21	290
33	10X20	250	13X20	260	13X20	320	13X25	360	16X25	370	16X25	390
47	13X20	300	13X20	390	13X25	390	16X25	430	16X31.5	470	18X31.5	480
68	13X20	470	16X21	470	16X25	520	18X25	560	18X31.5	580	18X41	630
100	16X21	580	16X25	630	16X31.5	680	18X35.5	700	18X41 18x31.5	790	18X45	850
150	16X25	690	18X25	840	18X35.5	860	18X45	960				
220	18X31.5	980	18X35.5	1050	18X45	1130						
330	18X41	1250	18X40	1610	18X45	930						

**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 Method1 08		
			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								
		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										
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							
			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				