



DC FAN LIFE EXPERIMENT REPORT

Available for these models with lower speed and same physical structure. All model may be followed by Rxx or Fxx series suffixes. This test report applies to EFB 40x40x20 mm series as the right table	EFB0412VD-00				
Representative Test P/N : EFB0412HHDD1K					
Equipment: 1.Oven: E24-T0165					

◎ **L₁₀ Expectancy: 70,000 hours minimum @ fan rated voltage and the temperature of 40 °C**
 According to the equation for **Weibull distribution**, **MTTF ≈ 7×L10 = 490,000 hours**

And we rely on a zero failure Weibull test strategy and accelerated testing technique, to determine the total test time (t) for verifying the above life estimation by the equations,

$$t = 1.036 \times \text{MTTF} \times [(B_{r,c}) \div n]^{0.91} \div A_F, \text{ and } A_F = 2^{(T_s - T_u)/10}$$

where, (B_{r,c}) is Poisson distribution factor with the failure number of r equal to 0 and the decimal confidence level of c equal to 0.90(90%).

Stress/Elevated Temperature T _s (°C) (Actual Test Temperature)	Unstress Temperature T _u (°C)	Acceleration Factor A _F	Quantity of Test Devices n (pcs)	Poisson Distribution Factor B _{r,c}	Required test time with zero failure t (hours)	Actual test time with zero failure t (hours)	Verified MTTF 40 °C (hours)	Verified L ₁₀ 40 °C (hours)
70	40	8.00	30	2.303	6,137	1,000.0	79,840	11,406

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2019/5/9 10:00 AM	2020/1/29 1:14 AM	<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination	1000.0

Herewith, we could assume as right on the basis of above test result. Besides, if the actual test time exceed the required, it comes out that those fans' L₁₀ expectancy and MTTF are greater than the warrant. (MTTF: means Mean Time To Failures, it should be used in a non-repairable system setting. Now we show the MTTF in our life report, that's because we will not repair the failed fans during life experiment. MTBF: means Mean Time Between failures, it should be used in a repairable system setting.

Temperature for MTTF Estimation (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	22.63	225,823	32,260
30	16.00	159,681	22,812
40	8.00	79,840	11,406
50	4.00	39,920	5,703
60	2.00	19,960	2,851
70	1.00	9,980	1,426

Fan permission criteria for the measurement after test :

1. Speed can not drop of ≥ 15% below the original measured rpm.
2. Current cannot increase > 15% of original measure current.
3. Noise cannot >3dB over the original measure noise.

Test Result	<input checked="" type="checkbox"/> Accept <input type="checkbox"/> Reject
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QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG19FNL057	214.00	2019/6/29	Poppy.Liang	Tim.Yi

BGN (dBA) : 15.9

Temp (°C) : 21.6



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
6,137	2019/5/9 10:00 AM	2020/1/29 1:14 AM	30	0	1000.0

Representative Test P/N : EFB0412HHDD1K	Current Test Status	<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination
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Equipment: 1.Oven: E24-T0165

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A)	Final Test Current Spec. (A)	Deviation (%)	Initial Test Speed Spec. (RPM)	Final Test Speed Spec. (RPM)	Deviation (%)	Initial Test Noise Spec. (dB A)	Final Test Noise Spec. (dB A)	Deviation 3 dBMax.
	0.15 Max.	0.15 Max.		6970-9430	6970-9430		35.0Max	35.0Max	
1	0.095	0.081	-14.7	7976	8215	3.0	31.8	32.9	1.1
2	0.090	0.084	-6.7	7843	8459	7.9	31.2	31.7	0.5
3	0.094	0.083	-11.7	7833	8341	6.5	31.2	33.6	2.4
4	0.088	0.084	-4.5	8009	8198	2.4	31.5	32.0	0.5
5	0.091	0.084	-7.7	7907	8246	4.3	31.2	32.5	1.3
6	0.089	0.082	-7.9	8083	8351	3.3	32.2	32.7	0.5
7	0.094	0.081	-13.8	7631	8447	10.7	33.1	33.8	0.7
8	0.085	0.087	2.4	8239	7929	-3.8	30.1	32.9	2.8
9	0.083	0.087	4.8	8282	7883	-4.8	31.2	33.0	1.8
10	0.089	0.078	-12.4	7757	8450	8.9	31.2	32.7	1.5
11	0.087	0.081	-6.9	8044	8501	5.7	31.4	34.0	2.6
12	0.089	0.083	-6.7	8106	8187	1.0	31.2	32.6	1.4
13	0.089	0.081	-9.0	8086	8243	1.9	30.9	32.0	1.1
14	0.079	0.083	5.1	8279	8368	1.1	31.7	31.9	0.2
15	0.088	0.095	8.0	7926	7908	-0.2	31.4	31.6	0.2
16	0.088	0.084	-4.5	8103	8087	-0.2	31.2	31.3	0.1
17	0.089	0.086	-3.4	7992	7958	-0.4	31.4	32.1	0.7
18	0.083	0.081	-2.4	8028	8281	3.2	33.0	34.2	1.2
19	0.086	0.082	-4.7	8190	8212	0.3	30.3	31.5	1.2
20	0.092	0.081	-12.0	7779	8327	7.0	31.6	32.3	0.7
21	0.083	0.081	-2.4	8210	8352	1.7	32.0	33.7	1.7
22	0.093	0.085	-8.6	7348	8028	9.3	30.2	31.2	1.0
23	0.083	0.084	1.2	8171	8451	3.4	32.2	32.6	0.4
24	0.088	0.081	-8.0	8251	8257	0.1	31.2	32.2	1.0
25	0.085	0.081	-4.7	8139	8314	2.2	30.2	33.1	2.9
26	0.085	0.082	-3.5	8193	8334	1.7	30.8	32.7	1.9
27	0.094	0.083	-11.7	7693	8163	6.1	31.0	32.2	1.2
28	0.085	0.086	1.2	8065	8003	-0.8	31.8	32.0	0.2
29	0.086	0.082	-4.7	8134	8321	2.3	31.5	32.6	1.1
30	0.089	0.082	-7.9	7929	8201	3.4	30.8	32.0	1.2
X-Bar	0.09	0.08		8007.53	8233.83		31.35	32.52	
σ	0.00	0.00		214.77	174.18		0.71	0.78	

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG19FNL057	214.00	2019/6/29	Poppy.Liang	Tim.Yi