



DC FAN LIFE EXPERIMENT REPORT

Available for these models with lower speed and same physical structure. All model may be followed byRxx orFxx series suffixes. This test report applies to **EFB 40x40x20.0 mm** series as the right table

EFB0412HHD-8F1Q

EFB0424VHD-BM50

EFB0424LD-SE28

EFB0424VHD-C

Representative Test P/N : EFB0412VHD-CF00

Equipment: 1.Oven: E24-F0055

On/Off Cycles: Every 500 hours

◎ **L₁₀ Expectancy: 70,000 hours minimum @ fan rated voltage and the temperature of 40 °C**

According to the equation for **Weibull distribution**, **MTTF $\cong$ 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 Ts (°C)	Unstress Temperature Tu (°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	56	2.303	3,478	8,360.0	1,177,878	168,268

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2008/5/9 11:30 AM	2009/1/1 5:16 PM	☐ In process	☐ In process (exceed requested)	☒ Termination	8360.0

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	3,331,541	475,934
30	16.00	2,355,755	336,536
40	8.00	1,177,878	168,268
50	4.00	588,939	84,134
60	2.00	294,469	42,067
70	1.00	147,235	21,034

Fan permission criteria for the measurement after test :

1. Speed can not drop of $\geq 15\%$ below the original measured rpm.
2. Current cannot increase $> 15\%$ of original measure current.
3. Noise cannot $> 3\text{dB}$ over the original measure noise.

Test Result

☒ **Accept**
☐ **Reject**

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG08FNL063	2216.00	2009/7/29	Nan Yang	Zenny Lei



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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EFB0412HHD-8F1Q	EFB0424VHD-BM50			
EFB0424LD-SE28				
EFB0424VHD-C				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2008/5/9 11:30 AM	2009/1/1 5:16 PM	56	0	8360.0

Representative Test P/N : EFB0412VHD-CF00	Current Test Status	☐ In process	☐ In process (exceed requested)	☒ Termination
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Equipment: 1.Oven: E24-F0055 On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (mA)	Final Test Current Spec. (mA)	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.
	180 Max.	180 Max.		8100-9900	8100-9900		39.0 Max	39.0 Max	
1	152	112	-26.3	8347	9613	15.2	34.3	36.5	2.2
2	163	113	-30.7	8434	9583	13.6	34.5	36.4	1.9
3	160	117	-26.9	8351	9782	17.1	34.1	36.8	2.7
4	145	113	-22.1	8454	9493	12.3	34.7	37.1	2.4
5	157	114	-27.4	8492	9696	14.2	34.9	36.3	1.4
6	151	112	-25.8	8266	9574	15.8	34.4	36.7	2.3
7	157	115	-26.8	8588	9845	14.6	34.9	36.1	1.2
8	149	116	-22.1	8464	9586	13.3	34.7	36.7	2.0
9	155	112	-27.7	8499	9561	12.5	34.5	36.4	1.9
10	147	114	-22.4	8513	9691	13.8	34.0	36.3	2.3
11	168	112	-33.3	8210	9644	17.5	34.7	36.5	1.8
12	153	111	-27.5	8328	9672	16.1	34.5	36.1	1.6
13	165	111	-32.7	8243	9630	16.8	34.2	36.2	2.0
14	154	115	-25.3	8414	9774	16.2	34.9	36.4	1.5
15	157	118	-24.8	8261	9725	17.7	34.4	36.3	1.9
16	164	116	-29.3	8360	9764	16.8	34.7	36.5	1.8
17	155	113	-27.1	8257	9650	16.9	34.2	36.7	2.5
18	165	110	-33.3	8349	9650	15.6	34.9	36.2	1.3
19	156	110	-29.5	8465	9565	13.0	34.6	36.6	2.0
20	155	110	-29.0	8435	9628	14.1	34.2	36.5	2.3
21	151	115	-23.8	8426	9503	12.8	34.5	36.1	1.6
22	157	113	-28.0	8353	9701	16.1	34.7	36.2	1.5
23	145	109	-24.8	8519	9693	13.8	34.4	36.4	2.0
24	155	113	-27.1	8251	9689	17.4	34.9	36.3	1.4
25	158	111	-29.7	8340	9551	14.5	34.2	36.5	2.3
26	161	112	-30.4	8336	9646	15.7	34.4	36.7	2.3
27	149	115	-22.8	8537	9767	14.4	34.7	36.7	2.0
28	156	115	-26.3	8238	9852	19.6	34.9	36.5	1.6
29	161	112	-30.4	8281	9586	15.8	34.9	36.6	1.7
30	154	115	-25.3	8236	9542	15.9	34.5	36.8	2.3
31	163	113	-30.7	8397	9582	14.1	34.7	36.9	2.2
32	149	112	-24.8	8356	9555	14.3	34.2	36.1	1.9
33	149	111	-25.5	8736	9659	10.6	34.7	36.4	1.7
34	127	110	-13.4	8807	9445	7.2	34.9	36.9	2.0
35	165	114	-30.9	8169	9541	16.8	34.3	36.5	2.2

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG08FNL063	2216.00	2009/7/29	Nan Yang	Zenny Lei



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EFB0424LD-SE28				
EFB0424VHD-C				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2008/5/9 11:30 AM	2009/1/1 5:16 PM	56	0	8360.0

Representative Test P/N : EFB0412VHD-CF00	Current Test Status	☐ In process	☐ In process (exceed requested)	☒ Termination
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Equipment: 1.Oven: E24-F0055	On/Off Cycles: Every 500 hours
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Test Data Between Initial Test and Final Test

Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation
	Current Spec.	Current Spec.		Speed Spec.	Speed Spec.		Noise Spec.	Noise Spec.	
	(mA) 180 Max.	(mA) 180 Max.		(RPM) 8100-9900	(RPM) 8100-9900		(dB A) 39.0 Max	(dB A) 39.0 Max	
36	154	115	-25.3	8294	9813	18.3	34.4	36.6	2.2
37	165	110	-33.3	8320	9594	15.3	34.1	36.9	2.8
38	152	113	-25.7	8347	9876	18.3	34.6	36.4	1.8
39	169	113	-33.1	8135	9729	19.6	34.4	36.5	2.1
40	152	108	-28.9	8438	9712	15.1	34.9	36.4	1.5
41	154	116	-24.7	8407	9685	15.2	34.4	36.5	2.1
42	156	115	-26.3	8197	9657	17.8	34.5	36.9	2.4
43	167	114	-31.7	8111	9839	21.3	34.7	36.7	2.0
44	159	116	-27.0	8105	9559	17.9	34.2	36.5	2.3
45	162	115	-29.0	8228	9541	16.0	34.5	35.5	1.0
46	154	112	-27.3	8529	9610	12.7	34.7	36.5	1.8
47	155	110	-29.0	8551	9565	11.9	34.2	35.9	1.7
48	157	112	-28.7	8262	9536	15.4	34.5	36.1	1.6
49	167	112	-32.9	8231	9710	18.0	34.9	36.4	1.5
50	159	111	-30.2	8199	9666	17.9	34.5	35.9	1.4
51	158	111	-29.7	8477	9718	14.6	34.0	36.1	2.1
52	155	116	-25.2	8413	9805	16.5	34.7	36.5	1.8
53	150	112	-25.3	8576	9620	12.2	34.5	36.5	2.0
54	141	112	-20.6	8629	9693	12.3	34.7	35.7	1.0
55	166	113	-31.9	8272	9535	15.3	34.4	36.2	1.8
56	157	116	-26.1	8388	9784	16.6	34.8	36.5	1.7
X-Bar	156.0	113.0	-	8371.8	9655.1	-	34.53	36.43	-
σ	7.421	2.199	-	147.870	100.931	-	0.261	0.304	-

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