



# 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 40x40x20.0 mm series as the right table	EFB0412HHD-8F1Q	EFB0424VHD-BM50		
	EFB0424LD-SE28	EFB0412MD-CF00		
	EFB0424VHD-C	EFB0412VHD-CYXQ		
	EFB0424VHDASA	EFB0424VHD-CP0		

**Representative Test P/N : EFB0412VHD-CF00**

**Equipment: 1.Oven: E24-F0055**

☉ **L<sub>10</sub> Expectancy: 70,000 hours minimum @ fan rated voltage and the temperature of 40°C**

According to the equation for **Weibull distribution**, **MTTF ≐ 7×L<sub>10</sub> = 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<sub>r;c</sub>) 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 <sub>s</sub> (°C)	Unstress Temperature T <sub>u</sub> (°C)	Acceleration Factor A <sub>F</sub>	Quantity of Test Devices n (pcs)	Poisson Distribution Factor B <sub>r;c</sub>	Required test time with zero failure t (hours)	Actual test time with zero failure t (hours)	Verified MTTF 40 °C (hours)	Verified L <sub>10</sub> 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	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> 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' L<sub>10</sub> 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 <sub>F</sub>	Estimated MTTF (hours)	Estimated L <sub>10</sub> (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
45	5.66	832,885	118,984
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:

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

<b>Test Result</b>	<input checked="" type="checkbox"/> Accept
	<input type="checkbox"/> 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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EFB0424VHDASA	EFB0424VHD-CP0		

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	<b>8360.0</b>

Representative Test P/N : EFB0412VHD-CF00	<b>Current Test Status</b>	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination

Equipment: 1.Oven: E24-F0055

### 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. (mA) <b>180 Max.</b>	Current Spec. (mA) <b>180 Max.</b>		Speed Spec. (RPM) <b>8100-9900</b>	Speed Spec. (RPM) <b>8100-9900</b>		Noise Spec. (dB A) <b>39.0 Max</b>	Noise Spec. (dB A) <b>39.0 Max</b>	
1	152	152	0.0	8347	8613	3.2	34.3	36.5	2.2
2	163	153	-6.1	8434	8583	1.8	34.5	36.4	1.9
3	160	157	-1.9	8351	8782	5.2	34.1	36.8	2.7
4	145	153	5.5	8454	8493	0.5	34.7	37.1	2.4
5	157	154	-1.9	8492	8696	2.4	34.9	36.3	1.4
6	151	152	0.7	8266	8574	3.7	34.4	36.7	2.3
7	157	155	-1.3	8588	8845	3.0	34.9	36.1	1.2
8	149	156	4.7	8464	8586	1.4	34.7	36.7	2.0
9	155	152	-1.9	8499	8561	0.7	34.5	36.4	1.9
10	147	154	4.8	8513	8691	2.1	34.0	36.3	2.3
11	168	152	-9.5	8210	8644	5.3	34.7	36.5	1.8
12	153	151	-1.3	8328	8672	4.1	34.5	36.1	1.6
13	165	151	-8.5	8243	8630	4.7	34.2	36.2	2.0
14	154	155	0.6	8414	8774	4.3	34.9	36.4	1.5
15	157	158	0.6	8261	8725	5.6	34.4	36.3	1.9
16	164	156	-4.9	8360	8764	4.8	34.7	36.5	1.8
17	155	153	-1.3	8257	8650	4.8	34.2	36.7	2.5
18	165	150	-9.1	8349	8651	3.6	34.9	36.2	1.3
19	156	150	-3.8	8465	8565	1.2	34.6	36.6	2.0
20	155	151	-2.6	8435	8628	2.3	34.2	36.5	2.3
21	151	155	2.6	8426	8503	0.9	34.5	36.1	1.6
22	157	153	-2.5	8353	8701	4.2	34.7	36.2	1.5
23	145	159	9.7	8519	8693	2.0	34.4	36.4	2.0
24	155	153	-1.3	8251	8689	5.3	34.9	36.3	1.4
25	158	151	-4.4	8340	8551	2.5	34.2	36.5	2.3
26	161	152	-5.6	8336	8646	3.7	34.4	36.7	2.3
27	149	155	4.0	8537	8767	2.7	34.7	36.7	2.0
28	156	155	-0.6	8238	8852	7.5	34.9	36.5	1.6
29	161	152	-5.6	8281	8586	3.7	34.9	36.6	1.7
30	154	155	0.6	8236	8542	3.7	34.5	36.8	2.3
31	163	153	-6.1	8397	8582	2.2	34.7	36.9	2.2
32	149	152	2.0	8356	8555	2.4	34.2	36.1	1.9
33	149	151	1.3	8736	8659	-0.9	34.7	36.4	1.7
34	151	154	2.0	8807	8445	-4.1	34.9	36.9	2.0
35	165	154	-6.7	8169	8541	4.6	34.3	36.5	2.2

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
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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 ) <b>180 Max.</b>	( mA ) <b>180 Max.</b>		( RPM ) <b>8100-9900</b>	( RPM ) <b>8100-9900</b>		( dB A ) <b>39.0 Max</b>	( dB A ) <b>39.0 Max</b>	
36	154	155	0.6	8294	8813	6.3	34.4	36.6	2.2
37	165	151	-8.5	8320	8594	3.3	34.1	36.9	2.8
38	152	153	0.7	8347	8876	6.3	34.6	36.4	1.8
39	169	153	-9.5	8135	8729	7.3	34.4	36.5	2.1
40	152	158	3.9	8438	8712	3.2	34.9	36.4	1.5
41	154	156	1.3	8407	8685	3.3	34.4	36.5	2.1
42	156	155	-0.6	8197	8657	5.6	34.5	36.9	2.4
43	167	154	-7.8	8111	8839	9.0	34.7	36.7	2.0
44	159	156	-1.9	8105	8559	5.6	34.2	36.5	2.3
45	162	155	-4.3	8228	8541	3.8	34.5	35.5	1.0
46	154	152	-1.3	8529	8610	0.9	34.7	36.5	1.8
47	155	151	-2.6	8551	8565	0.2	34.2	35.9	1.7
48	157	152	-3.2	8262	8536	3.3	34.5	36.1	1.6
49	167	151	-9.6	8231	8710	5.8	34.9	36.4	1.5
50	159	151	-5.0	8199	8666	5.7	34.5	35.9	1.4
51	158	154	-2.5	8477	8718	2.8	34.0	36.1	2.1
52	155	156	0.6	8413	8805	4.7	34.7	36.5	1.8
53	150	152	1.3	8576	8620	0.5	34.5	36.5	2.0
54	141	152	7.8	8629	8693	0.7	34.7	35.7	1.0
55	166	153	-7.8	8272	8535	3.2	34.4	36.2	1.8
56	157	156	-0.6	8388	8784	4.7	34.8	36.5	1.7
X-Bar	156.4	153.5	-	8371.8	8655.1	-	34.53	36.43	-
$\sigma$	6.327	2.132	-	147.870	100.930	-	0.261	0.304	-

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<b>DG08FNL063</b>	<b>2216.00</b>	<b>2009/7/29</b>	<b>Nan Yang</b>	<b>Zenny Lei</b>