



# 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 FFB 36x36x28 mm series as the right table	FFB03612EHN-BGA				
	FFB03612EHN-ALB				

<b>Representative Test P/N : FFB03612EHN-7FB(SP3)</b>					
<b>Equipment: 1.Oven: E24-F0053</b>			On/Off Cycles: Every 500 hours		

◎ **L<sub>10</sub> Expectancy: 50,000 hours minimum @ fan rated voltage and the temperature of 40°C**  
 According to the equation for **Weibull distribution**, **MTTF ≐ 7×L10 = 350,000 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 Ts (°C)	Unstress Temperature Tu (°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	2,484	15,889.0	2,238,672	319,810

### Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2008/8/22 10:30 AM	2009/5/1 2:37 AM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	15889.0

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	6,331,920	904,560
30	16.00	4,477,343	639,620
40	8.00	2,238,672	319,810
50	4.00	1,119,336	159,905
60	2.00	559,668	79,953
70	1.00	279,834	39,976

- 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"/> <b>Accept</b>
	<input type="checkbox"/> <b>Reject</b>

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG08FNL142	3556.00	2010/11/13	Nan Yang	Jack Li



# DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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FFB03612EHN-BGA				
FFB03612EHN-ALB				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
2,484	2008/8/22 10:30 AM	2009/5/1 2:37 AM	56	0	<b>15889.0</b>

Representative Test P/N : FFB03612EHN-7FB(SP3)	<b>Current Test Status</b>	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination
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Equipment: 1.Oven: E24-F0053 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
	<b>400 Max.</b>	<b>400 Max.</b>		<b>13050-15950</b>	<b>13050-15950</b>		<b>54.0 Max</b>	<b>54.0 Max</b>	
1	373	345	-7.5	14051	14880	5.9	50.0	50.9	0.9
2	368	350	-4.9	14095	14727	4.5	49.8	50.1	0.3
3	358	349	-2.5	14116	14858	5.3	50.3	50.8	0.5
4	361	340	-5.8	13869	14638	5.5	50.4	50.2	-0.2
5	367	343	-6.5	13998	14899	6.4	49.9	50.6	0.7
6	343	343	0.0	14254	14853	4.2	50.1	50.3	0.2
7	393	376	-4.3	14256	15046	5.5	50.0	50.5	0.5
8	358	360	0.6	14059	14991	6.6	49.9	50.7	0.8
9	358	358	0.0	13917	15124	8.7	49.7	50.4	0.7
10	370	350	-5.4	13757	14941	8.6	50.3	50.8	0.5
11	399	366	-8.3	14469	14652	1.3	50.4	50.3	-0.1
12	345	344	-0.3	13987	15018	7.4	50.2	50.4	0.2
13	362	347	-4.1	13959	14906	6.8	49.8	50.3	0.5
14	349	340	-2.6	13976	14777	5.7	50.1	50.3	0.2
15	365	385	5.5	14049	15255	8.6	49.7	50.8	1.1
16	357	362	1.4	14276	14758	3.4	50.2	50.3	0.1
17	370	348	-5.9	14068	14903	5.9	49.9	50.7	0.8
18	353	360	2.0	14172	14586	2.9	50.1	50.4	0.3
19	361	345	-4.4	13945	14839	6.4	50.2	50.6	0.4
20	342	351	2.6	14027	14724	5.0	49.9	50.1	0.2
21	368	391	6.3	14406	15198	5.5	50.0	50.7	0.7
22	359	339	-5.6	13938	14856	6.6	50.1	50.4	0.3
23	348	346	-0.6	13951	15295	9.6	50.3	50.6	0.3
24	350	359	2.6	14170	14563	2.8	49.9	50.3	0.4
25	350	331	-5.4	14247	14975	5.1	50.2	50.1	-0.1
26	341	361	5.9	13913	15230	9.5	50.1	50.4	0.3
27	346	353	2.0	14075	14857	5.6	49.8	50.6	0.8
28	363	369	1.7	14225	14682	3.2	50.4	50.0	-0.4
29	356	352	-1.1	13723	14946	8.9	49.9	50.6	0.7
30	387	355	-8.3	14148	14890	5.2	50.1	50.4	0.3
31	370	351	-5.1	13958	14978	7.3	50.2	50.7	0.5
32	368	339	-7.9	14155	14494	2.4	50.4	50.3	-0.1
33	383	356	-7.0	14607	14856	1.7	50.1	50.6	0.5
34	357	375	5.0	14342	15034	4.8	49.9	50.4	0.5
35	366	347	-5.2	13777	14820	7.6	49.8	50.8	1.0

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
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Equipment: 1.Oven: E24-F0053 On/Off Cycles: Every 500 hours

### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec.	Final Test Current Spec.	Deviation (%)	Initial Test Speed Spec.	Final Test Speed Spec.	Deviation (%)	Initial Test Noise Spec.	Final Test Noise Spec.	Deviation
	( mA ) <b>400 Max.</b>	( mA ) <b>400 Max.</b>		( RPM ) <b>13050-15950</b>	( RPM ) <b>13050-15950</b>		( dB A ) <b>54.0 Max</b>	( dB A ) <b>54.0 Max</b>	
36	356	354	-0.6	14291	14748	3.2	50.2	50.3	0.1
37	360	346	-3.9	14080	14725	4.6	50.2	50.7	0.5
38	366	371	1.4	14185	15185	7.0	50.1	50.4	0.3
39	320	325	1.6	13969	15029	7.6	49.8	50.6	0.8
40	378	375	-0.8	14329	15353	7.1	50.1	50.8	0.7
41	384	354	-7.8	14389	15057	4.6	50.0	50.4	0.4
42	367	350	-4.6	14106	14485	2.7	49.9	50.6	0.7
43	377	341	-9.5	14473	14961	3.4	50.2	50.1	-0.1
44	352	349	-0.9	14231	14699	3.3	50.3	50.4	0.1
45	383	356	-7.0	14244	14898	4.6	49.9	50.7	0.8
46	357	365	2.2	14102	14882	5.5	50.3	50.4	0.1
47	370	360	-2.7	14039	14526	3.5	49.8	50.6	0.8
48	368	350	-4.9	14192	14930	5.2	49.8	50.8	1.0
49	378	362	-4.2	14170	14993	5.8	50.4	50.3	-0.1
50	348	360	3.4	14239	15023	5.5	49.9	50.7	0.8
51	357	359	0.6	14069	14689	4.4	49.8	50.4	0.6
52	366	334	-8.7	14265	14949	4.8	50.2	50.6	0.4
53	385	369	-4.2	14206	15108	6.3	49.7	50.8	1.1
54	341	320	-6.2	14343	14375	0.2	50.1	50.3	0.2
55	370	343	-7.3	14006	14692	4.9	49.9	50.6	0.7
56	361	357	-1.1	13929	15031	7.9	50.3	50.4	0.1
X-Bar	362.6	353.3	-	14121.3	14881.9	-	50.05	50.49	-
$\sigma$	14.444	13.511	-	183.397	211.004	-	0.206	0.221	-

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<b>DG08FNL142</b>	<b>3556.00</b>	<b>2010/11/13</b>	<b>Nan Yang</b>	<b>Jack Li</b>