



# DC FAN LIFE EXPERIMENT REPORT

Available for these models with lower speed and same physical structure. All model may be followed by ARxx or AFxx series suffixes. This test report applies to <b>AFB25x25x10 mm</b> series as the right table	AFB02512HHA	AFB02512HA	AFB02512MA	AFB02512LA	
	AFB02505HHA	AFB02505HA	AFB02505MA	AFB02505LA	

**Representative Test P/N :AFB02512HHA-A**

**Equipment: 1.Oven: E24-F0030** On/Off Cycles: Every 500 hours

**⊙ L<sub>10</sub> Expectancy: 30,000 hours minimum @ fan rated voltage and the temperature of 40°C**

According to the equation for **Weibull distribution**, **MTTF ≅ 7×L10 = 210,000 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) ( Actual Test Temperature )	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)
<b>70</b>	<b>40</b>	<b>8.00</b>	<b>56</b>	<b>2.303</b>	<b>1,490</b>	<b>1,490.0</b>	<b>209,933</b>	<b>29,990</b>

**Test Progress:**

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
<b>2006/2/13 10:30 PM</b>	2006/4/24 10:58 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	<b>1490.0</b>

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. **Basically , MTBF is equal to MTTF , they use same formula to work out a life data. )**

Temperature for MTTF Estimation (°C)	Acceleration Factor A <sub>F</sub>	Estimated MTTF (hours)	Estimated L <sub>10</sub> (hours)
25	22.63	593,779	84,826
30	16.00	419,865	59,981
40	8.00	209,933	29,990
50	4.00	104,966	14,995
60	2.00	52,483	7,498
<b>70</b>	<b>1.00</b>	<b>26,242</b>	<b>3,749</b>

- Fan permission criteria for the measurement after test :
1. For current, the limit is less than spec.(max.).
  2. For speed, the allowable decrease is less than 15%.
  3. For noise, the limit is less than spec.(max.). + 3 dB

<b>Test Result</b>	<input checked="" type="checkbox"/> <b>Accept</b> <input type="checkbox"/> <b>Reject</b>
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QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
<b>DG06FNL035</b>	<b>190.00</b>	<b>2006/4/24 10:30 PM</b>	<b>Nan.Yang</b>	<b>GL.Liu</b>



## DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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This test report applies to AFB25x25x10 mm series as the right table

AFB02512HHA	AFB02512HA	AFB02512MA	AFB02512LA	
AFB02505HHA	AFB02505HA	AFB02505MA	AFB02505LA	

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
1,490	2006/2/13 10:30 PM	2006/4/24 10:58 PM	56	0	1490.0

Representative Test P/N :AFB02512HHA-A	Current Test Status	<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-F0030 On/Off Cycles: Every 500 hours

### 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. (A)	Current Spec. (A)		Speed Spec. (RPM)	Speed Spec. (RPM)		Noise Spec. (dB A)	Noise Spec. (dB A)	
	<b>0.12Max.</b>	<b>0.12Max.</b>		<b>11050-14950</b>	<b>11050-14950</b>		<b>34.0Max</b>	<b>34.0Max</b>	
1	0.03	0.03	0.0	11886	11681	-1.7	28.8	28.2	-2.1
2	0.03	0.03	0.0	11336	12179	7.4	27.8	28.5	2.5
3	0.03	0.03	0.0	11937	11590	-2.9	27.2	28.0	2.9
4	0.03	0.03	0.0	11277	12093	7.2	27.8	28.4	2.2
5	0.03	0.03	0.0	11810	11878	0.6	27.7	28.3	2.2
6	0.03	0.03	0.0	11873	11701	-1.4	28.2	28.5	1.1
7	0.03	0.03	0.0	11492	11847	3.1	27.2	28.1	3.3
8	0.03	0.03	0.0	11619	11618	0.0	28.0	27.8	-0.7
9	0.03	0.03	0.0	11457	12001	4.7	27.9	27.6	-1.1
10	0.03	0.03	0.0	11161	11659	4.5	27.2	27.8	2.2
11	0.03	0.03	0.0	11130	11275	1.3	27.4	27.8	1.5
12	0.03	0.03	0.0	11722	11736	0.1	27.8	28.0	0.7
13	0.03	0.03	0.0	11551	12026	4.1	27.5	28.1	2.2
14	0.03	0.03	0.0	11358	12847	13.1	27.7	28.2	1.8
15	0.03	0.03	0.0	11490	11839	3.0	27.4	28.5	4.0
16	0.03	0.03	0.0	11428	12192	6.7	27.9	27.8	-0.4
17	0.03	0.03	0.0	11435	11774	3.0	27.7	27.6	-0.4
18	0.03	0.03	0.0	11222	11948	6.5	28.1	28.0	-0.4
19	0.03	0.03	0.0	11473	12145	5.9	28.2	28.0	-0.7
20	0.03	0.03	0.0	11645	12013	3.2	28.0	28.1	0.4
21	0.03	0.03	0.0	11702	11945	2.1	27.8	27.6	-0.7
22	0.03	0.03	0.0	11328	11963	5.6	27.7	27.9	0.7
23	0.03	0.03	0.0	11660	12424	6.6	27.2	28.2	3.7
24	0.03	0.03	0.0	11719	12224	4.3	28.0	27.9	-0.4
25	0.03	0.03	0.0	11617	11793	1.5	27.7	27.9	0.7
26	0.03	0.03	0.0	11376	11952	5.1	27.5	28.2	2.5
27	0.03	0.03	0.0	11319	11952	5.6	28.3	28.5	0.7
28	0.03	0.03	0.0	11786	12095	2.6	28.8	27.9	-3.1
29	0.03	0.03	0.0	11465	12139	5.9	28.7	28.1	-2.1
30	0.03	0.03	0.0	11815	12033	1.8	27.7	28.0	1.1
31	0.03	0.03	0.0	11353	12226	7.7	27.9	27.6	-1.1
32	0.03	0.03	0.0	11689	11942	2.2	27.5	27.3	-0.7
33	0.03	0.03	0.0	11813	12986	9.9	27.4	27.4	0.0
34	0.03	0.03	0.0	11178	11786	5.4	27.6	27.4	-0.7
35	0.03	0.03	0.0	11440	11812	3.3	28.0	27.8	-0.7

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG06FNL035	190.00	2006/4/24 10:30 PM	Nan.Yang	GL.Liu



## DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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				AFB02505HHA	AFB02505HA	AFB02505MA	AFB02505LA		
<b>Required Test Time (hrs)</b>	<b>Date for Test Beginning</b>	<b>Date for Test Termination</b>	<b>Sample Size (pcs):</b>	<b>Failure (pcs):</b>	<b>Current Total Test Time (hrs)</b>				
1,490	2006/2/13 10:30 PM	2006/4/24 10:58 PM	56	0	<b>1490.0</b>				
Representative Test P/N :AFB02512HHA-A				<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-F0030						On/Off Cycles: Every 500 hours			
<b>Test Data Between Initial Test and Final Test</b>									
Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)
	Current Spec. (A)	Current Spec. (A)		Speed Spec. (RPM)	Speed Spec. (RPM)		Noise Spec. (dB A)	Noise Spec. (dB A)	
	<b>0.12Max.</b>	<b>0.12Max.</b>		<b>11050-14950</b>	<b>11050-14950</b>		<b>34.0Max</b>	<b>34.0Max</b>	
36	0.03	0.03	0.0	12043	12126	0.7	27.7	27.6	-0.4
37	0.03	0.03	0.0	11332	11993	5.8	27.2	27.3	0.4
38	0.03	0.03	0.0	11513	11992	4.2	27.5	27.6	0.4
39	0.03	0.03	0.0	11467	11686	1.9	27.4	27.7	1.1
40	0.03	0.03	0.0	11809	12078	2.3	27.7	27.6	-0.4
41	0.03	0.03	0.0	11309	12325	9.0	27.9	27.5	-1.4
42	0.03	0.03	0.0	11927	12705	6.5	27.5	28.1	2.2
43	0.03	0.03	0.0	11237	12270	9.2	27.4	28.2	2.9
44	0.03	0.03	0.0	11508	11985	4.1	27.2	28.0	2.9
45	0.03	0.03	0.0	11768	12163	3.4	27.9	27.6	-1.1
46	0.03	0.03	0.0	11466	11805	3.0	27.8	27.4	-1.4
47	0.03	0.03	0.0	11521	12012	4.3	27.4	27.0	-1.5
48	0.03	0.03	0.0	11765	12011	2.1	27.5	27.1	-1.5
49	0.03	0.03	0.0	11467	12037	5.0	27.3	27.6	1.1
50	0.03	0.03	0.0	11414	12029	5.4	27.4	27.8	1.5
51	0.03	0.03	0.0	11242	11888	5.7	27.8	28.0	0.7
52	0.03	0.03	0.0	11532	12363	7.2	27.7	28.2	1.8
53	0.03	0.03	0.0	11135	12082	8.5	27.2	28.0	2.9
54	0.03	0.03	0.0	11415	12138	6.3	27.5	27.9	1.5
55	0.03	0.03	0.0	11508	11890	3.3	27.8	27.3	-1.8
56	0.03	0.03	0.0	11840	12257	3.5	28.1	27.7	-1.4
X-Bar	0.030	0.030	-	11433.1	11745.8	-	27.61	27.76	-
$\sigma$	0.000	0.000	-	243.166	349.823	-	0.362	0.393	-
<b>QE File No.</b>	<b>Time-out for function test or others (hrs)</b>			<b>Issued Date</b>		<b>Reported By</b>		<b>Approved By</b>	
<b>DG06FNL035</b>	<b>190.00</b>			<b>2006/4/24 10:30 PM</b>		<b>Nan.Yang</b>		<b>GL.Liu</b>	