



# 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 AFB35x35x10 mm series as the right table	AFB03512HA-A	AFB03505MA-A	AFB03512HA-AYFQ	AFB03512MA-CF00	
	AFB03512MA-A	AFB03505LA-A	AFB03505HAYDR	AFB03505HAYBY	
	AFB03512LA-A	AFB03512MA-9P90	AFB03505HA-CF00		
	AFB03505HA-A	AFB03512HA-AF00	AFB03512HA-CF00		

**Representative Test P/N :AFB03512HA-A**

<b>Equipment: 1.Oven: E24-F0032</b>	<b>On/Off Cycles: Every 500 hours</b>
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⊙ **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)
70	40	8.00	56	2.303	1,490	10,490.0	1,477,983	211,140

**Test Progress:**

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2006/3/2 4:00 PM	2007/4/30 8:58 AM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	10490.0

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	4,180,366	597,195
30	16.00	2,955,965	422,281
40	8.00	1,477,983	211,140
50	4.00	738,991	105,570
60	2.00	369,496	52,785
70	1.00	184,748	26,393

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
DG06FNL048	8678.50	2008/5/9 8:30 AM	Nan.Yang	Zenny Lei



## DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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				AFB03512LA-A	AFB03512MA-9P90	AFB03505HA-CF00			
				AFB03505HA-A	AFB03512HA-AF00	AFB03512HA-CF00			
<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	2006/3/2 4:00 PM	2007/4/30 8:58 AM	56	0	<b>10490.0</b>				
Representative Test P/N :AFB03512HA-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-F0032				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. (mA) <b>140 Max.</b>	Current Spec. (mA) <b>140 Max.</b>		Speed Spec. (RPM) <b>5950-8050</b>	Speed Spec. (RPM) <b>5950-8050</b>		Noise Spec. (dB A) Verified MTFE <b>28.0Max</b>	Noise Spec. (dB A)	
1	33	31	-6.1	6738	6988	3.7	21.7	23.5	8.3
2	35	31	-11.4	7158	6934	-3.1	21.8	23.7	8.7
3	29	31	6.9	6563	7023	7.0	21.6	24.1	11.6
4	36	31	-13.9	6860	6769	-1.3	21.6	23.9	10.6
5	34	32	-5.9	6563	6565	0.0	22.0	23.4	6.4
6	32	30	-6.3	6646	6399	-3.7	21.8	23.9	9.6
7	36	29	-19.4	6763	6849	1.3	22.1	23.1	4.5
8	33	29	-12.1	6721	7003	4.2	21.6	23.7	9.7
9	34	31	-8.8	6758	6946	2.8	22.4	23.8	6.3
10	33	31	-6.1	6673	6924	3.8	22.6	23.5	4.0
11	32	29	-9.4	6817	7055	3.5	22.7	23.0	1.3
12	35	30	-14.3	6801	6750	-0.7	22.5	23.9	6.2
13	34	32	-5.9	6784	6973	2.8	22.8	23.7	3.9
14	36	31	-13.9	6716	6784	1.0	23.0	23.8	3.5
15	33	30	-9.1	6653	6916	4.0	23.4	23.2	-0.9
16	35	32	-8.6	6826	6209	-9.0	22.6	23.9	5.8
17	30	32	6.7	6707	6683	-0.4	23.1	23.4	1.3
18	31	32	3.2	6735	6721	-0.2	22.7	23.7	4.4
19	33	30	-9.1	6520	6665	2.2	23.0	23.5	2.2
20	34	31	-8.8	6569	6537	-0.5	22.8	23.9	4.8
21	32	31	-3.1	6595	6962	5.6	23.1	23.7	2.6
22	35	31	-11.4	6676	7035	5.4	23.2	23.5	1.3
23	32	31	-3.1	6746	6824	1.2	22.6	23.9	5.8
24	33	30	-9.1	6828	6788	-0.6	22.5	23.8	5.8
25	30	31	3.3	6193	7002	13.1	22.4	23.5	4.9
26	35	30	-14.3	6748	6828	1.2	22.5	23.9	6.2
27	31	30	-3.2	6621	7184	8.5	22.8	24.3	6.6
28	33	32	-3.0	7302	6650	-8.9	22.6	23.7	4.9
29	34	32	-5.9	6714	6739	0.4	22.7	23.9	5.3
30	31	31	0.0	6745	6533	-3.1	22.6	23.2	2.7
31	31	31	0.0	6536	7034	7.6	22.7	23.8	4.8
32	33	29	-12.1	6494	7007	7.9	23.0	23.7	3.0
33	33	31	-6.1	6613	6377	-3.6	22.9	23.8	3.9
34	34	29	-14.7	6557	6987	6.6	22.6	23.5	4.0
35	32	30	-6.3	6754	6895	2.1	22.8	23.7	3.9
<b>QE File No.</b>	<b>Time-out for function test or others (hours)</b>			<b>Issued Date</b>		<b>Reported By</b>		<b>Approved By</b>	
DG06FNL048	8678.50			2008/5/9 8:30 AM		Nan Yang		Zenny Lei	



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<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	2006/3/2 4:00 PM	2007/4/30 8:58 AM	56	0	<b>10490.0</b>				
Representative Test P/N :AFB03512HA-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-F0032					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. (mA) <b>140 Max.</b>	Current Spec. (mA) <b>140 Max.</b>		Speed Spec. (RPM) <b>5950-8050</b>	Speed Spec. (RPM) <b>5950-8050</b>		Noise Spec. (dB A) <b>Verified MTTF</b> <b>28.0Max</b>	Noise Spec. (dB A)	
36	30	28	-6.7	7414	6663	-10.1	22.5	23.9	6.2
37	36	33	-8.3	6413	6712	4.7	22.7	23.4	3.1
38	32	30	-6.3	6941	7087	2.1	22.9	23.8	3.9
39	33	30	-9.1	7643	7859	2.8	23.1	23.9	3.5
40	34	31	-8.8	6528	7013	7.4	22.8	23.5	3.1
41	32	29	-9.4	6967	6489	-6.9	22.7	23.9	5.3
42	35	30	-14.3	6728	6751	0.3	23.2	23.5	1.3
43	32	30	-6.3	7532	7584	0.7	22.8	23.7	3.9
44	32	31	-3.1	6551	7025	7.2	22.5	23.9	6.2
45	33	32	-3.0	6727	6958	3.4	22.4	23.9	6.7
46	34	30	-11.8	7448	7625	2.4	22.3	23.5	5.4
47	34	29	-14.7	6724	7120	5.9	23.0	23.9	3.9
48	36	33	-8.3	6706	6958	3.8	23.1	23.8	3.0
49	32	30	-6.3	6763	6895	2.0	22.6	23.4	3.5
50	33	31	-6.1	6792	6952	2.4	22.7	23.2	2.2
51	32	30	-6.3	6822	7256	6.4	22.9	23.7	3.5
52	29	30	3.4	6646	7136	7.4	23.0	23.5	2.2
53	31	27	-12.9	6845	7256	6.0	22.9	23.9	4.4
54	32	29	-9.4	6344	7105	12.0	22.5	23.4	4.0
55	33	30	-9.1	6706	7215	7.6	22.4	23.8	6.3
56	31	30	-3.2	7187	7569	5.3	22.7	23.2	2.2
X-Bar	32.9	30.5	-	6770.0	6924.4	-	22.6	23.7	-
$\sigma$	1.771	1.175	-	276.461	303.957	-	0.423	0.264	-
<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>	
DG06FNL048		8678.50		2008/5/9 8:30 AM		Nan.Yang		Zenny Lei	