



# 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>AFB40x40x15mm</b> series as the right table	AFB0412VHB	AFB0412SHB-SE09	AFB0412SHB-T500		
	AFB0412VHB-TP25	AFB0412HB-BX13			
	AUB0412HB-8C1R	AFB0412SHB-SP04			
	AFB0412SHB-SE08	AFB0412SHB-SP17			

<b>Representative Test P/N : AFB0412SHB-AF00</b>	
<b>Equipment: 1.Oven: E24-F0031</b>	<b>On/Off Cycles: Every 500 hours</b>

◎ **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×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<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	3,478	3,478.0	490,031	70,004

**Test Progress:**

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2004/12/2 9:00 PM	2005/6/6 3:46 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	3478.0

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	1,386,017	198,002
30	16.00	980,062	140,009
40	8.00	490,031	70,004
50	4.00	245,015	35,002
60	2.00	122,508	17,501
70	1.00	61,254	8,751

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>

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG04FNL342	981.00	2005/6/6 4:00 PM	Guie.Lin	Gx.Xu



## DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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 AFB40x40x15mm series as the right table

AFB0412VHB	AFB0412SHB-SE09	AFB0412SHB-T500	
AFB0412VHB-TP25	AFB0412HB-BX13		
AUB0412HB-8C1R	AFB0412SHB-SP04		
AFB0412SHB-SE08	AFB0412SHB-SP17		

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2004/12/2 9:00 PM	2005/6/6 3:46 PM	56	0	<b>3478.0</b>

Representative Test P/N : AFB0412SHB-AF00	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-F0031 On/Off Cycles: Every 500 hours

### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A)	Final Test Current Spec. (A)	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>0.22Max.</b>	<b>0.22Max.</b>		<b>10120-11880</b>	<b>10120-11880</b>		<b>44.5Max</b>	<b>44.5Max</b>	
1	0.16	0.16	0.0	10677	11372	6.5	43.2	43.0	-0.5
2	0.16	0.16	0.0	11421	10375	-9.2	43.0	42.7	-0.7
3	0.15	0.15	0.0	10881	10712	-1.6	43.4	42.6	-1.8
4	0.16	0.16	0.0	11066	10734	-3.0	43.1	43.1	0.0
5	0.16	0.16	0.0	10742	10766	0.2	43.3	42.5	-1.8
6	0.16	0.15	-6.3	10992	10832	-1.5	44.2	43.5	-1.6
7	0.16	0.15	-6.3	10765	10848	0.8	43.5	43.6	0.2
8	0.16	0.14	-12.5	10790	10121	-6.2	43.4	43.9	1.2
9	0.16	0.16	0.0	11047	11157	1.0	43.7	44.0	0.7
10	0.16	0.16	0.0	11742	10749	-8.5	43.3	43.4	0.2
11	0.16	0.16	0.0	11965	11049	-7.7	43.1	43.0	-0.2
12	0.16	0.17	6.3	10427	10559	1.3	43.6	43.3	-0.7
13	0.16	0.15	-6.3	10995	10111	-8.0	43.5	43.6	0.2
14	0.16	0.16	0.0	11294	10859	-3.9	43.2	44.1	2.1
15	0.15	0.16	6.7	10731	10846	1.1	43.7	43.5	-0.5
16	0.16	0.16	0.0	10898	11135	2.2	43.4	43.0	-0.9
17	0.16	0.15	-6.3	10894	10060	-7.7	43.1	42.9	-0.5
18	0.16	0.16	0.0	10889	10948	0.5	43.3	43.6	0.7
19	0.16	0.16	0.0	10899	10700	-1.8	43.2	43.9	1.6
20	0.16	0.16	0.0	10764	11066	2.8	43.8	43.3	-1.1
21	0.16	0.16	0.0	10757	10789	0.3	42.9	43.5	1.4
22	0.16	0.15	-6.3	11028	10737	-2.6	43.4	43.6	0.5
23	0.16	0.16	0.0	11001	10983	-0.2	43.7	43.7	0.0
24	0.16	0.17	6.3	10642	10456	-1.7	43.5	44.0	1.1
25	0.16	0.16	0.0	10997	10894	-0.9	43.3	43.4	0.2
26	0.16	0.16	0.0	10926	10834	-0.8	43.8	43.1	-1.6
27	0.16	0.15	-6.3	10957	11002	0.4	44.1	43.5	-1.4
28	0.16	0.16	0.0	10856	10807	-0.5	43.6	43.0	-1.4
29	0.16	0.15	-6.3	10809	10811	0.0	43.2	43.6	0.9
30	0.16	0.16	0.0	10679	11010	3.1	43.5	43.4	-0.2
31	0.16	0.16	0.0	10694	10466	-2.1	43.7	43.8	0.2
32	0.16	0.15	-6.3	11241	11909	5.9	43.4	44.0	1.4
33	0.16	0.15	-6.3	10972	11611	5.8	43.3	43.7	0.9
34	0.16	0.16	0.0	10991	10667	-2.9	43.8	43.5	-0.7
35	0.16	0.15	-6.3	10945	10475	-4.3	43.4	43.2	-0.5

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG04FNL342	981.00	2005/6/6 4:00 PM	Guie.Lin	Gx.Xu



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Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2004/12/2 9:00 PM	2005/6/6 3:46 PM	56	0	<b>3478.0</b>

Representative Test P/N : AFB0412SHB-AF00	<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-F0031	On/Off Cycles: Every 500 hours
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### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. ( A ) <b>0.22Max.</b>	Final Test Current Spec. ( A ) <b>0.22Max.</b>	Deviation (%)	Initial Test Speed Spec. ( RPM ) <b>10120-11880</b>	Final Test Speed Spec. ( RPM ) <b>10120-11880</b>	Deviation (%)	Initial Test Noise Spec. ( dB A ) <b>44.5Max</b>	Final Test Noise Spec. ( dB A ) <b>44.5Max</b>	Deviation (%)
36	0.16	0.16	0.0	11246	10626	-5.5	43.7	43.1	-1.4
37	0.16	0.16	0.0	10992	11705	6.5	43.6	43.6	0.0
38	0.16	0.15	-6.3	10897	10784	-1.0	43.5	43.8	0.7
39	0.16	0.16	0.0	10924	11307	3.5	44.4	43.7	-1.6
40	0.16	0.16	0.0	10941	11086	1.3	43.7	44.0	0.7
41	0.16	0.16	0.0	10648	10712	0.6	43.5	44.0	1.1
42	0.16	0.17	6.3	10596	10860	2.5	43.7	43.7	0.0
43	0.16	0.16	0.0	10674	10769	0.9	43.4	43.5	0.2
44	0.16	0.16	0.0	10869	10967	0.9	43.1	43.6	1.2
45	0.15	0.16	6.7	10942	10811	-1.2	43.0	43.9	2.1
46	0.16	0.17	6.3	11270	10019	-11.1	43.6	43.4	-0.5
47	0.16	0.15	-6.3	10945	10972	0.2	43.8	43.2	-1.4
48	0.16	0.16	0.0	11472	10937	-4.7	43.3	44.0	1.6
49	0.16	0.16	0.0	10979	10890	-0.8	43.5	43.5	0.0
50	0.16	0.16	0.0	11421	10470	-8.3	44.2	43.7	-1.1
51	0.16	0.16	0.0	10954	10538	-3.8	43.7	43.3	-0.9
52	0.16	0.16	0.0	11426	10865	-4.9	43.4	43.0	-0.9
53	0.16	0.16	0.0	10623	10699	0.7	43.6	44.0	0.9
54	0.16	0.14	-12.5	10943	10810	-1.2	43.8	43.6	-0.5
55	0.16	0.16	0.0	11092	10388	-6.3	43.5	43.8	0.7
56	0.16	0.16	0.0	10996	10812	-1.7	43.7	43.5	-0.5
X-Bar	0.159	0.158	-	10968.3	10812.1	-	43.51	43.49	-
$\sigma$	0.002	0.006	-	279.614	359.311	-	0.307	0.381	-

QE File No.	Time-out for function test or others (hrs)	Issued Date	Reported By	Approved By
DG04FNL342	981.00	2005/6/6 4:00 PM	Guie.Lin	Gx.Xu