



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 AFB 50x50x20 mm series as the right table	AFB0512VHD	AFB0512HHD	AFB0512HD	AFB0512MD	AFB0512LD
	AFB0505HD	AFB0505MD	AFB0505LD		
	AFB0524VHD	AFB0524HHD	AFB0524HD	AFB0524MD	AFB0524LD

Representative Test P/N :AFB0512VHD

Equipment: 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D On/Off Cycles: Every 500 hours

☉ **L₁₀ Expectancy: 70,000 hours minimum @ fan rated voltage and the temperature of 40°C**

According to the equation for **Weibull distribution**, **MTTF \cong 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_{r,c}**) 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%), and

Stress/Elevated Temperature T _s (°C)	Unstress Temperature T _u (°C)	Acceleration Factor A _F	Quantity of Test Devices n (pcs)	Poisson Distribution Factor B _{r,c}	Required test time with zero failure t (hours)	Actual test time with zero failure t (hours)	Verified MTTF 40 °C (hours)	Verified L ₁₀ 40 °C (hours)
80	40	16.00	56	2.303	1,739	6,240.0	1,758,363	251,195

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2001/9/3 8:00 AM	2002/1/4 11:53 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	6240.0

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' L₁₀ 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 _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	45.25	4,973,400	710,486
30	32.00	3,516,725	502,389
40	16.00	1,758,363	251,195
50	8.00	879,181	125,597
60	4.00	439,591	62,799
70	2.00	219,795	31,399
80	1.00	109,898	15,700

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

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
01FNS045-L	1229.00	2002/7/11 1:00 PM	<i>Huang Chung</i>	<i>[Signature]</i>



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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	AFB0505HD	AFB0505MD	AFB0505LD		
	AFB0524VHD	AFB0524HHD	AFB0524HD	AFB0524MD	AFB0524LD

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
1,739	2001/9/3 8:00 AM	2002/1/4 11:53 PM	56	0	6240.0

Representative Test P/N :AFB0512VHD	Current Test Status	<input type="checkbox"/>	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination
		In process		

Equipment: 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D	On/Off Cycles: Every 500 hours
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Test Data Between Initial Test and Final Test

Sample P/N :AFB0512VHD

Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)
	Current Spec. (A) 0.24 Max.	Current Spec. (A) 0.24 Max.		Speed Spec. (RPM) 7000 Ref.	Speed Spec. (RPM) 5950 Min.		Noise Spec. (dB A) 38.5 Max.	Noise Spec. (dB A) 41.5 Max.	
1	0.18	0.16	-11.1	6809	7214	5.9	36.1	36.20	0.3
2	0.18	0.16	-11.1	6944	7234	4.2	36.7	36.20	-1.4
3	0.18	0.16	-11.1	6838	7242	5.9	36.2	36.20	0.0
4	0.18	0.16	-11.1	6894	7171	4.0	36.4	36.00	-1.1
5	0.17	0.16	-5.9	6880	7135	3.7	36.3	35.90	-1.1
6	0.18	0.16	-11.1	7217	7185	-0.4	36.3	36.10	-0.6
7	0.18	0.16	-11.1	6940	7319	5.5	36.3	36.50	0.6
8	0.17	0.16	-5.9	7043	7282	3.4	36.8	39.20	6.5
9	0.17	0.17	0.0	6783	7340	8.2	36.1	36.50	1.1
10	0.17	0.16	-5.9	7081	7243	2.3	37.7	36.20	-4.0
11	0.17	0.16	-5.9	7038	7322	4.0	36.0	36.50	1.4
12	0.18	0.16	-11.1	6957	7266	4.4	35.7	36.30	1.7
13	0.18	0.16	-11.1	6980	7243	3.8	36.4	36.20	-0.5
14	0.17	0.16	-5.9	7058	7279	3.1	35.8	36.30	1.4
15	0.18	0.17	-5.6	6927	7254	4.7	35.9	36.30	1.1
16	0.18	0.17	-5.6	6860	7268	5.9	36.3	36.30	0.0
17	0.18	0.16	-11.1	7061	7254	2.7	36.1	36.30	0.6
18	0.18	0.17	-5.6	7016	7208	2.7	36.2	36.10	-0.3
19	0.18	0.16	-11.1	6967	7238	3.9	36.7	36.20	-1.4
20	0.18	0.16	-11.1	6798	7254	6.7	36.1	36.30	0.6
21	0.17	0.16	-5.9	6823	7234	6.0	35.7	36.20	1.4
22	0.18	0.17	-5.6	6849	7273	6.2	35.2	36.30	3.1
23	0.18	0.17	-5.6	6945	7305	5.2	35.4	36.40	2.8
24	0.18	0.16	-11.1	6956	7194	3.4	36.0	36.10	0.3
25	0.18	0.17	-5.6	6887	7232	5.0	35.6	36.20	1.7
26	0.17	0.15	-11.8	6672	7022	5.2	35.8	35.60	-0.6
27	0.17	0.16	-5.9	6957	7166	3.0	36.2	36.00	-0.6
28	0.18	0.16	-11.1	6964	7231	3.8	35.5	36.20	2.0
29	0.17	0.17	0.0	6972	7154	2.6	36.0	36.00	0.0
30	0.18	0.16	-11.1	6917	7194	4.0	35.9	36.10	0.6
31	0.17	0.16	-5.9	6876	7115	3.5	36.1	35.90	-0.6
32	0.18	0.16	-11.1	6910	7201	4.2	36.3	36.10	-0.6
33	0.18	0.16	-11.1	6838	7190	5.1	36.1	36.10	0.0
34	0.18	0.16	-11.1	6845	7135	4.2	36.2	35.90	-0.8
35	0.17	0.16	-5.9	6797	7195	5.9	35.7	36.10	1.1



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	Current Spec. (A) 0.24 Max.	Current Spec. (A) 0.24 Max.		Speed Spec. (RPM) 7000 Ref.	Speed Spec. (RPM) 5950 Min.		Noise Spec. (dB A) 38.5 Max.	Noise Spec. (dB A) 41.5 Max.	
36	0.18	0.17	-5.6	6936	7242	4.4	36.5	36.2	-0.8
37	0.17	0.16	-5.9	7016	7195	2.6	33.0	36.1	9.4
38	0.18	0.16	-11.1	6854	7167	4.6	35.8	36.0	0.6
39	0.18	0.17	-5.6	6986	7280	4.2	36.0	36.4	1.1
40	0.18	0.16	-11.1	6790	7092	4.4	36.3	35.8	-1.4
41	0.18	0.17	-5.6	6880	7182	4.4	36.0	36.1	0.3
42	0.17	0.16	-5.9	6827	7140	4.6	36.6	35.9	-1.9
43	0.18	0.17	-5.6	7076	7227	2.1	36.2	36.2	0.0
44	0.17	0.15	-11.8	6785	7050	3.9	36.2	35.7	-1.4
45	0.18	0.17	-5.6	7135	7305	2.4	35.9	36.4	1.4
46	0.18	0.16	-11.1	6878	7240	5.3	35.0	36.2	3.4
47	0.17	0.16	-5.9	6724	6967	3.6	35.3	35.4	0.3
48	0.18	0.16	-11.1	6800	7142	5.0	35.7	35.9	0.6
49	0.17	0.15	-11.8	6812	7132	4.7	36.2	35.9	-0.8
50	0.17	0.16	-5.9	6971	7327	5.1	35.6	36.5	2.5
51	0.19	0.16	-15.8	6930	7135	3.0	36.1	35.9	-0.6
52	0.17	0.16	-5.9	6908	7121	3.1	36.1	35.9	-0.6
53	0.17	0.15	-11.8	6838	7114	4.0	35.6	35.9	0.8
54	0.18	0.16	-11.1	6916	7276	5.2	35.8	36.3	1.4
55	0.18	0.16	-11.1	6937	7268	4.8	36.1	36.3	0.6
56	0.16	0.16	0.0	6940	7109	2.4	35.2	35.8	1.7
X-Bar	0.176	0.162	-	6915	7205	-	36.0	36.2	-
σ	0.006	0.005	-	102.852	77.820	-	0.599	0.470	-

QE File No.	Time-out for function test or others (hrs)	Issued Date	Reported By	Approved By
01FNS045-L	1229.00	2002/7/11 1:00 PM	<i>Hung Chung</i>	<i>John</i>