

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 AFB120x120x38.0 mm series as the right table	AFB1212HHEAU5			
	AFB1212GHE-CF00			

Representative Test P/N :AFB1212EHE-CF00

Equipment: 70°C Burn-in Room 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 ≐ 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%).

Stress/Elevated Temperature Ts (°C) (Actual Test Temperature)	Unstress Temperature Tu (°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)
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)
2005/4/11 11:30 PM	2006/2/28 7:46 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' 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	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

Test Result

Accept
 Reject

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG05FNL070	4270.50	2006/2/28 8:00 PM	Guie.Lin	gx.xu



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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AFB1212HHEAU5			
AFB1212GHE-CF00			

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2005/4/11 11:30 PM	2006/2/28 7:46 PM	56	0	3478.0
Representative Test P/N :AFB1212EHE-CF00			Current Test Status	<input type="checkbox"/> In process <input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination
Equipment: 70°C Burn-in Room				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)	
	3.24Max.	3.24Max.		4680-5720	4680-5720		66.0Max	66.0Max	
1	2.45	2.44	-0.4	5164	5196	0.6	62.3	62.3	0.0
2	2.48	2.48	0.0	5232	5124	-2.1	62.5	62.5	0.0
3	2.52	2.47	-2.0	5224	5187	-0.7	62.4	62.7	0.5
4	2.36	2.37	0.4	5156	5116	-0.8	62.4	62.5	0.2
5	2.42	2.39	-1.2	5162	5198	0.7	62.8	62.2	-1.0
6	2.42	2.43	0.4	5163	5151	-0.2	62.5	62.7	0.3
7	2.35	2.35	0.0	5131	5142	0.2	62.7	62.4	-0.5
8	2.43	2.37	-2.5	5159	5207	0.9	62.4	62.6	0.3
9	2.51	2.52	0.4	5222	5253	0.6	62.6	62.3	-0.5
10	2.42	2.40	-0.8	5138	5119	-0.4	62.3	62.5	0.3
11	2.46	2.44	-0.8	5150	5067	-1.6	62.7	62.8	0.2
12	2.46	2.42	-1.6	5132	5183	1.0	62.6	62.4	-0.3
13	2.50	2.53	1.2	5204	5263	1.1	62.8	62.8	0.0
14	2.48	2.51	1.2	5221	5187	-0.7	62.7	62.2	-0.8
15	2.46	2.48	0.8	5159	5114	-0.9	62.5	62.7	0.3
16	2.51	2.47	-1.6	5088	5252	3.2	62.7	62.5	-0.3
17	2.46	2.44	-0.8	5096	5140	0.9	62.4	62.4	0.0
18	2.44	2.48	1.6	5116	5100	-0.3	62.8	62.2	-1.0
19	2.56	2.56	0.0	5066	5210	2.8	62.7	62.8	0.2
20	2.47	2.46	-0.4	5158	5256	1.9	62.4	62.4	0.0
21	2.55	2.53	-0.8	5204	5259	1.1	62.5	62.9	0.6
22	2.40	2.46	2.5	5104	5193	1.7	62.9	62.4	-0.8
23	2.34	2.36	0.9	5175	5146	-0.6	62.5	62.9	0.6
24	2.53	2.55	0.8	5204	5196	-0.2	62.7	62.8	0.2
25	2.53	2.50	-1.2	5203	5182	-0.4	62.4	62.7	0.5
26	2.44	2.46	0.8	5144	5151	0.1	62.8	62.5	-0.5
27	2.52	2.58	2.4	5212	5269	1.1	62.6	62.8	0.3
28	2.33	2.30	-1.3	5012	5031	0.4	62.5	62.4	-0.2
29	2.41	2.46	2.1	5183	5212	0.6	62.7	62.3	-0.6
30	2.58	2.60	0.8	5151	5233	1.6	62.4	62.3	-0.2
31	2.45	2.40	-2.0	5185	5190	0.1	62.9	62.8	-0.2
32	2.54	2.47	-2.8	5212	5215	0.1	62.5	62.4	-0.2
33	2.53	2.56	1.2	5256	5152	-2.0	62.7	62.9	0.3
34	2.45	2.51	2.4	5173	5152	-0.4	62.7	62.7	0.0
35	2.44	2.44	0.0	5175	5156	-0.4	62.5	62.8	0.5

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG05FNL070	4270.50	2006/2/28 8:00 PM	Guie.Lin	gx.xu



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AFB1212HHEAU5	
AFB1212GHE-CF00	

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2005/4/11 11:30 PM	2006/2/28 7:46 PM	56	0	3478.0

Representative Test P/N :AFB1212EHE-CF00	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: 70°C Burn-in Room 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)	
	3.24Max.	3.24Max.		4680-5720	4680-5720		66.0Max	66.0Max	
36	2.49	2.49	0.0	5114	5166	1.0	62.4	62.5	0.2
37	2.56	2.58	0.8	5273	5260	-0.2	62.8	62.2	-1.0
38	2.53	2.50	-1.2	5145	5241	1.9	62.5	62.7	0.3
39	2.46	2.45	-0.4	5127	5167	0.8	62.7	62.5	-0.3
40	2.48	2.48	0.0	5133	5164	0.6	62.4	62.8	0.6
41	2.48	2.50	0.8	5199	5195	-0.1	62.5	62.3	-0.3
42	2.49	2.50	0.4	5365	5162	-3.8	62.9	62.5	-0.6
43	2.61	2.40	-8.0	5134	5205	1.4	62.4	62.7	0.5
44	2.47	2.49	0.8	5202	5153	-0.9	62.8	62.3	-0.8
45	2.38	2.38	0.0	5099	5136	0.7	62.3	62.4	0.2
46	2.55	2.52	-1.2	5232	5162	-1.3	62.7	62.8	0.2
47	2.48	2.46	-0.8	5155	5120	-0.7	62.5	62.2	-0.5
48	2.50	2.45	-2.0	5112	5209	1.9	62.5	62.7	0.3
49	2.59	2.61	0.8	5230	5313	1.6	62.8	62.5	-0.5
50	2.42	2.50	3.3	5185	5121	-1.2	62.4	62.3	-0.2
51	2.53	2.51	-0.8	5211	5222	0.2	62.5	62.5	0.0
52	2.56	2.56	0.0	5207	5124	-1.6	62.5	62.4	-0.2
53	2.49	2.52	1.2	5253	5225	-0.5	62.6	62.7	0.2
54	2.49	2.54	2.0	5204	5207	0.1	62.4	62.5	0.2
55	2.42	2.40	-0.8	5106	5192	1.7	62.4	62.3	-0.2
56	2.43	2.48	2.1	5260	5117	-2.7	62.8	62.6	-0.3
X-Bar	2.475	2.473	-	5173.4	5180.2	-	62.58	62.53	-
σ	0.063	0.066	-	58.763	54.669	-	0.171	0.212	-

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