



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 BFB97x94x33 mm series as the right table	BFB1012EH	BFB1012SH	BFB1012VH	BFB1012HH	BFB1012M
	BFB1012L	BFB1012VH-4M2C			

Representative Test P/N : BFB1012EH-AF00

Equipment: 1.Oven: E24-F0037 On/Off Cycles: Every 500 hours

☉ **L₁₀ Expectancy: 50,000 hours minimum @ fan rated voltage and the temperature of 40°C**

According to the equation for **Weibull distribution**, **MTTF ≐ 7×L10 = 350,000 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)
60	40	4.00	56	2.303	4,968	4,968.0	349,982	49,997

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2004/6/12 6:30 PM	2005/6/5 5:15 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	4968.0

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	11.31	989,898	141,414
30	8.00	699,964	99,995
40	4.00	349,982	49,997
50	2.00	174,991	24,999
60	1.00	87,495	12,499

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
DG04FNL177	3622.50	2005/6/5 5:00 PM	Guie.Lin	gx.xu

Note: The test sample equivalent to STD, Part number: BFB1012EH-AF00.



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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BFB1012EH	BFB1012SH	BFB1012VH	BFB1012HH	BFB1012M
BFB1012L	BFB1012VH-4M2C			

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
4,968	2004/6/12 6:30 PM	2005/6/5 5:15 PM	56	0	4968.0

Representative Test P/N : BFB1012EH-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-F0037 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)	
	2.94Max.	2.94Max.		4876-5724	4876-5724		68.0Max	68.0Max	
1	1.94	1.93	-0.5	4951	5081	2.6	63.8	63.5	-0.5
2	1.88	1.89	0.5	5026	5133	2.1	63.3	64.2	1.4
3	1.92	1.84	-4.2	4989	5050	1.2	63.5	63.9	0.6
4	1.88	1.84	-2.1	5050	5041	-0.2	63.1	63.7	1.0
5	1.97	1.89	-4.1	5098	5083	-0.3	63.6	64.2	0.9
6	1.84	1.79	-2.7	5045	4994	-1.0	63.4	63.7	0.5
7	1.98	1.86	-6.1	5136	5093	-0.8	63.4	63.5	0.2
8	1.93	1.84	-4.7	5110	5108	0.0	63.1	64.0	1.4
9	1.78	1.82	2.2	5030	5113	1.7	63.3	63.2	-0.2
10	1.95	1.87	-4.1	4975	4916	-1.2	63.1	63.5	0.6
11	1.90	1.85	-2.6	5032	5005	-0.5	63.5	64.2	1.1
12	1.87	1.87	0.0	4987	5015	0.6	63.2	63.2	0.0
13	1.82	1.77	-2.7	5003	5023	0.4	63.6	63.6	0.0
14	1.84	1.74	-5.4	5120	4986	-2.6	63.6	63.9	0.5
15	1.87	1.85	-1.1	4924	5018	1.9	63.4	64.2	1.3
16	1.78	1.78	0.0	4938	4954	0.3	63.2	63.7	0.8
17	1.89	1.87	-1.1	5062	5047	-0.3	63.1	63.2	0.2
18	1.97	1.91	-3.0	5028	5057	0.6	63.1	63.5	0.6
19	1.91	1.85	-3.1	5127	5136	0.2	63.4	64.2	1.3
20	1.94	1.87	-3.6	5133	5095	-0.7	63.6	63.7	0.2
21	1.98	1.91	2.0	5123	5115	-0.2	63.1	63.2	0.2
22	1.99	1.89	2.0	5097	5101	0.1	62.9	63.9	1.6
23	1.84	1.76	-4.3	5020	5045	0.5	63.5	63.5	0.0
24	1.98	1.96	-1.0	5117	5085	-0.6	63.7	63.8	0.2
25	1.98	1.97	-0.5	5051	5015	-0.7	63.1	63.2	0.2
26	1.87	1.85	-1.1	4991	4993	0.0	63.4	63.7	0.5
27	1.85	1.82	-1.6	5027	4998	-0.6	63.2	63.5	0.5
28	1.86	1.82	-2.2	5053	5068	0.3	63.4	64.2	1.3
29	1.84	1.82	-1.1	4916	4959	0.9	63.4	63.5	0.2
30	1.87	1.79	-4.3	5045	4997	-1.0	63.2	64.2	1.6
31	1.76	1.69	-4.0	4928	4967	0.8	63.4	63.8	0.6
32	1.80	1.75	-2.8	5057	5047	-0.2	63.7	63.5	-0.3
33	1.77	1.66	-6.2	5057	4986	-1.4	63.1	64.1	1.6
34	1.97	1.87	-5.1	5178	5034	-2.8	63.3	63.5	0.3
35	1.93	1.87	-3.1	5094	5102	0.2	63.5	64.0	0.8

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG04FNL177	3622.50	2005/6/5 5:00 PM	Guie.Lin	gx.xu



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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)	
	2.94Max.	2.94Max.		4876-5724	4876-5724		68.0Max	68.0Max	
36	1.93	1.85	-4.1	5090	5054	-0.7	63.3	63.9	0.9
37	1.98	1.94	-2.0	5180	5185	0.1	63.3	64.2	1.4
38	1.85	1.85	0.0	5080	5186	2.1	63.3	64.5	1.9
39	1.84	1.80	-2.2	4957	5075	2.4	63.4	63.9	0.8
40	1.90	1.84	-3.2	5148	5017	-2.5	63.5	63.2	-0.5
41	1.85	1.81	-2.2	5141	4941	-3.9	63.3	64.2	1.4
42	1.94	1.92	-1.0	4997	5068	1.4	63.1	63.7	1.0
43	1.91	1.88	-1.6	4925	5059	2.7	63.4	64.5	1.7
44	1.90	1.87	-1.6	5126	5116	-0.2	63.5	63.3	-0.3
45	1.79	1.74	-2.8	5014	5019	0.1	63.2	63.1	-0.2
46	1.82	1.73	-4.9	5081	5052	-0.6	63.1	63.6	0.8
47	1.95	1.95	0.0	5040	4965	-1.5	63.5	63.9	0.6
48	1.97	1.84	-6.6	5028	4882	-2.9	63.4	64.0	0.9
49	1.88	1.75	-6.9	5067	4942	-2.5	63.1	64.2	1.7
50	1.85	1.76	-4.9	5075	4981	-1.9	63.6	64.5	1.4
51	1.94	1.88	-3.1	5134	5069	-1.3	63.3	63.8	0.8
52	2.02	1.94	-4.0	5083	5157	1.5	63.4	63.5	0.2
53	1.95	1.85	-5.1	5058	5013	-0.9	63.9	64.1	0.3
54	1.93	1.87	-3.1	5018	5007	-0.2	63.2	63.9	1.1
55	1.96	1.89	-3.6	5064	5033	-0.6	63.7	64.2	0.8
56	1.98	1.94	-2.0	5071	5125	1.1	63.5	63.7	0.3
X-Bar	1.898	1.844	-	5052.8	5043.9	-	63.36	63.79	-
σ	0.066	0.068	-	65.941	65.443	-	0.210	0.370	-

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