



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 BFB76.5x70.2x20 mm series as the right table				
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Representative Test P/N :BFB0712HD-R00	
Equipment: 1.Oven: E24-F0031	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)
70	40	8.00	56	2.303	2,484	2,485.0	350,123	50,018

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2005/3/6 3:30 PM	2005/6/29 3:07 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	2485.0

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' I₄₀ 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 _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	22.63	990,296	141,471
30	16.00	700,245	100,035
40	8.00	350,123	50,018
50	4.00	175,061	25,009
60	2.00	87,531	12,504
70	1.00	43,765	6,252

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	<input checked="" type="checkbox"/> Accept
	<input type="checkbox"/> Reject

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG05FNL047	275.50	2005/6/29 4:00 PM	Guie.Lin	Gx.Xu



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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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)
2,484	2005/3/6 3:30 PM	2005/6/29 3:07 PM	56	0	2485.0
Representative Test P/N :BFB0712HD-R00			Current Test Status		<input type="checkbox"/> In process <input type="checkbox"/> In process (exceed requested) <input checked="" type="checkbox"/> Termination
Equipment: 1.Oven: E24-F0031				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)	
	0.37Max.	0.37Max.		3600-4400	3600-4400		46.0Max	46.0Max	
1	0.30	0.29	-3.3	4173	4273	2.4	43.7	43.7	0.0
2	0.30	0.30	0.0	4184	4287	2.5	43.0	44.5	3.5
3	0.31	0.30	-3.2	4347	4352	0.1	44.2	44.0	-0.5
4	0.30	0.30	0.0	4248	4077	-4.0	44.5	43.8	-1.6
5	0.31	0.31	0.0	4346	4328	-0.4	44.0	43.6	-0.9
6	0.31	0.31	0.0	4251	4289	0.9	44.3	44.2	-0.2
7	0.30	0.29	-3.3	4267	4094	-4.1	43.7	44.5	1.8
8	0.31	0.30	-3.2	4256	4287	0.7	43.9	44.7	1.8
9	0.30	0.29	-3.3	4242	4121	-2.9	44.2	44.3	0.2
10	0.30	0.30	0.0	4246	4319	1.7	43.5	44.9	3.2
11	0.30	0.30	0.0	4218	4327	2.6	43.9	43.5	-0.9
12	0.30	0.30	0.0	4289	4288	0.0	44.1	43.9	-0.5
13	0.30	0.31	3.3	4267	4288	0.5	44.2	43.7	-1.1
14	0.30	0.30	0.0	4263	4290	0.6	44.4	44.0	-0.9
15	0.29	0.31	6.9	4205	4245	1.0	43.5	44.1	1.4
16	0.31	0.31	0.0	4191	4274	2.0	43.8	44.5	1.6
17	0.29	0.30	3.4	4015	4265	6.2	44.5	43.5	-2.2
18	0.30	0.31	3.3	4235	4284	1.2	44.9	44.7	-0.4
19	0.30	0.30	0.0	4197	4271	1.8	45.1	44.9	-0.4
20	0.31	0.30	-3.2	4320	4311	-0.2	44.2	43.9	-0.7
21	0.32	0.30	-6.3	4247	4331	2.0	44.7	43.7	-2.2
22	0.30	0.30	0.0	4169	4201	0.8	43.1	43.5	0.9
23	0.30	0.29	-3.3	4306	4294	-0.3	44.2	43.8	-0.9
24	0.31	0.30	-3.2	4277	4289	0.3	44.6	44.2	-0.9
25	0.30	0.30	0.0	4290	4315	0.6	43.1	44.5	3.2
26	0.31	0.29	-6.5	4294	4320	0.6	44.5	44.7	0.4
27	0.31	0.31	0.0	4205	4037	-4.0	44.3	44.3	0.0
28	0.31	0.30	-3.2	4304	4328	0.6	44.2	44.9	1.6
29	0.31	0.30	-3.2	4340	4320	-0.5	44.5	43.7	-1.8
30	0.32	0.29	-9.4	4239	4273	0.8	44.9	43.9	-2.2
31	0.30	0.31	3.3	4255	4212	-1.0	43.1	43.5	0.9
32	0.31	0.30	-3.2	4229	4288	1.4	43.9	44.0	0.2
33	0.30	0.29	-3.3	4343	4326	-0.4	44.2	43.9	-0.7
34	0.30	0.30	0.0	4328	4262	-1.5	44.5	44.2	-0.7
35	0.30	0.30	0.0	4363	4309	-1.2	43.8	44.7	2.1

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG05FNL047	275.50	2005/6/29 4:00 PM	Guie.Lin	Gx.Xu



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	Current Spec. (A)	Current Spec. (A)		Speed Spec. (RPM)	Speed Spec. (RPM)		Noise Spec. (dB A)	Noise Spec. (dB A)	
	0.37Max.	0.37Max.		3600-4400	3600-4400		46.0Max	46.0Max	
36	0.29	0.30	3.4	4209	4261	1.2	44.2	43.8	-0.9
37	0.31	0.30	-3.2	4226	4305	1.9	44.7	44.0	-1.6
38	0.31	0.30	-3.2	4220	4284	1.5	43.9	43.7	-0.5
39	0.30	0.30	0.0	4211	4283	1.7	43.6	43.5	-0.2
40	0.29	0.30	3.4	4230	4270	0.9	44.2	44.2	0.0
41	0.28	0.30	7.1	4089	4308	5.4	44.7	44.3	-0.9
42	0.30	0.30	0.0	4232	4279	1.1	43.8	44.5	1.6
43	0.30	0.30	0.0	4264	4296	0.8	44.1	43.9	-0.5
44	0.30	0.29	-3.3	4241	4207	-0.8	44.3	44.5	0.5
45	0.31	0.30	-3.2	4217	4261	1.0	44.1	43.8	-0.7
46	0.29	0.30	3.4	4154	4251	2.3	43.9	44.7	1.8
47	0.31	0.31	0.0	4227	4268	1.0	44.5	44.2	-0.7
48	0.31	0.30	-3.2	4203	4310	2.5	45.1	43.9	-2.7
49	0.31	0.31	0.0	4238	4264	0.6	44.7	43.5	-2.7
50	0.31	0.30	-3.2	4315	4296	-0.4	43.9	44.6	1.6
51	0.31	0.31	0.0	4286	4261	-0.6	44.2	44.2	0.0
52	0.30	0.29	-3.3	4234	4283	1.2	45.1	43.8	-2.9
53	0.31	0.30	-3.2	4244	4335	2.1	44.7	43.5	-2.7
54	0.30	0.30	0.0	4208	4297	2.1	45.3	44.2	-2.4
55	0.30	0.30	0.0	4307	4273	-0.8	44.6	43.9	-1.6
56	0.30	0.30	0.0	4233	4215	-0.4	44.1	44.7	1.4
X-Bar	0.303	0.303	-	4244.4	4262.9	-	44.19	44.08	-
σ	0.008	0.006	-	62.114	57.357	-	0.519	0.476	-

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