

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 BFB45x45x20mm series as the right table	BFB04512HHD-F00	BFB04512HD-F00	BFB04512MD-F00		
	BFB04512VHD-R00	BFB04512HHD-R00	BFB04512HD-R00	BFB04512MD-R00	

Representative Test P/N :BFB04512VHD-F00

Equipment: 1.Oven: E24-W520 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%), and

Stress/Elevated Temperature T _s (°C) (Actual Test Temperature)	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)
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)
2006/4/17 9:30 AM	2006/9/24 4:16 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	<input checked="" type="checkbox"/> Accept <input type="checkbox"/> Reject
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QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
WJQFML-2006012	369.00	2006/9/24 4:30 PM	YUHONG.SUN	ANGLER.LIU



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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BFB04512HHD-F00	BFB04512HD-F00	BFB04512MD-F00	
BFB04512VHD-R00	BFB04512HHD-R00	BFB04512HD-R00	BFB04512MD-R00

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2006/4/17 9:30 AM	2006/9/24 4:16 PM	56	0	3478.0

Representative Test P/N :BFB04512VHD-F00	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-W520 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 Check. (dB A)	
	0.24max.	0.24max.		4500±8%	4500-15%		34.5max.	34.5+3max.	
1	0.16	0.15	9.4	4397	5062	15.1	30.4	33.6	10.5
2	0.16	0.15	9.4	4373	4804	9.9	30.5	33.7	10.5
3	0.16	0.15	6.9	4338	5010	15.5	30.0	34.0	13.3
4	0.16	0.15	6.9	4248	4968	16.9	30.6	33.7	10.1
5	0.16	0.15	7.5	4449	5067	13.9	31.2	33.7	8.0
6	0.16	0.15	8.1	4367	5081	16.3	30.5	33.8	10.8
7	0.16	0.15	8.1	4357	4949	13.6	30.4	33.6	10.5
8	0.16	0.15	6.9	4389	5028	14.6	30.9	35.3	14.2
9	0.16	0.15	7.5	4354	4888	12.3	30.9	33.7	9.1
10	0.16	0.15	7.5	4374	5021	14.8	31.4	34.0	8.3
11	0.16	0.15	8.1	4350	5046	16.0	31.0	33.7	8.7
12	0.16	0.15	8.8	4392	4973	13.2	31.1	33.9	9.0
13	0.16	0.15	8.8	4333	5048	16.5	30.3	34.0	12.2
14	0.16	0.15	8.8	4375	5040	15.2	30.2	34.6	14.6
15	0.16	0.15	6.3	4342	5026	15.8	31.5	34.0	7.9
16	0.16	0.15	6.9	4392	4959	12.9	30.9	35.3	14.2
17	0.16	0.15	9.4	4496	5032	11.9	31.5	34.1	8.3
18	0.16	0.15	6.3	4449	4905	10.2	31.0	34.6	11.6
19	0.16	0.15	6.9	4335	5018	15.8	31.0	33.9	9.4
20	0.16	0.15	6.9	4329	4975	14.9	30.4	34.2	12.5
21	0.16	0.15	8.1	4372	5000	14.4	30.3	34.3	13.2
22	0.16	0.15	9.4	4301	4964	15.4	30.4	33.5	10.2
23	0.16	0.15	6.9	4349	5046	16.0	30.7	34.0	10.7
24	0.16	0.15	8.1	4415	5031	14.0	30.5	34.3	12.5
25	0.16	0.15	7.5	4345	4961	14.2	30.1	34.2	13.6
26	0.16	0.14	10.0	4418	4973	12.6	30.5	35.6	16.7
27	0.16	0.15	6.3	4298	5068	17.9	30.5	35.2	15.4
28	0.16	0.15	8.8	4342	5022	15.7	30.3	34.7	14.5
29	0.16	0.14	11.3	4322	5008	15.9	31.1	34.6	11.3
30	0.16	0.15	8.1	4272	5116	19.8	31.2	33.7	8.0
31	0.16	0.15	8.8	4318	5016	16.2	31.6	34.3	8.5
32	0.16	0.15	8.1	4292	5021	17.0	30.1	34.5	14.6
33	0.16	0.15	8.1	4266	5097	19.5	31.0	36.8	18.7
34	0.16	0.14	12.5	4327	5040	16.5	31.1	35.7	14.8
35	0.16	0.15	7.5	4450	4968	11.6	30.5	33.5	9.8
Mean (X-Bar)	0.160	0.147	-	4356.1	5007.6	-	30.73	34.29	-
Standard Deviation	0.000	0.002	-	54.855	61.841	-	0.439	0.741	-

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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 Check. (dB A)	
	0.24max.	0.24max.		4500±8%	4500-15%		34.5max.	34.5+3max.	
36	0.16	0.15	4.4	4339	4958	14.3	31.2	34.6	10.9
37	0.16	0.15	7.5	4308	5069	17.7	30.3	33.9	11.9
38	0.16	0.15	8.1	4352	5058	16.2	30.6	34.0	11.1
39	0.16	0.15	7.5	4301	5040	17.2	31.2	33.9	8.7
40	0.16	0.15	8.1	4363	5026	15.2	31.2	33.5	7.4
41	0.16	0.15	8.1	4291	4931	14.9	31.3	33.7	7.7
42	0.16	0.15	7.5	4414	5031	14.0	30.4	34.6	13.8
43	0.16	0.15	9.4	4320	4939	14.3	30.0	33.9	13.0
44	0.16	0.15	8.1	4430	5049	14.0	30.5	33.7	10.5
45	0.16	0.15	8.8	4299	4974	15.7	30.4	34.0	11.8
46	0.16	0.15	7.5	4364	5005	14.7	30.8	34.7	12.7
47	0.16	0.14	10.0	4443	5000	12.5	30.9	34.6	12.0
48	0.16	0.15	7.5	4328	5031	16.2	30.4	35.6	17.1
49	0.16	0.15	8.8	4283	4961	15.8	30.2	34.6	14.6
50	0.16	0.15	8.8	4560	4917	7.8	31.2	34.1	9.3
51	0.16	0.15	6.9	4486	5036	12.3	31.5	34.5	9.5
52	0.16	0.15	8.1	4367	4933	13.0	30.6	34.3	12.1
53	0.16	0.15	6.3	4395	5027	14.4	31.4	33.9	8.0
54	0.16	0.15	8.8	4378	5036	15.0	31.6	35.8	13.3
55	0.16	0.15	7.5	4386	4945	12.7	30.5	34.2	12.1
56	0.16	0.15	9.4	4346	4928	13.4	31.4	34.4	9.6
Mean (X-Bar)	0.160	0.147	-	4369.2	4995.0	-	30.84	34.31	-
Standard Deviation	0.000	0.002	-	68.930	49.782	-	0.485	0.580	-

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