



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 BFB 45x45x10.0 mm series as the right table	BFB04512HHA-DV52			
	BFB04512HHA-CZ0T			

Representative Test P/N : BFB04512HHA-7G94

Equipment: 1.Oven: E24-F0057

☉ **L₁₀ Expectancy: 3,600 hours minimum @ fan rated voltage and the temperature of 70°C**
 According to the equation for **Weibull distribution**, **MTTF ≐ 7×L10 = 25,200 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 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 70 °C (hours)	Verified L ₁₀ 70 °C (hours)
70	70	1.00	56	2.303	1,431	5,431.0	95,650	13,664

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2008/4/5 11:00 AM	2008/7/17 1:51 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	5431.0

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.

Temperature for MTTF Estimation (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	22.63	2,164,306	309,187
30	16.00	1,530,395	218,628
40	8.00	765,198	109,314
50	4.00	382,599	54,657
60	2.00	191,299	27,328
70	1.00	95,650	13,664

Fan permission criteria for the measurement after test :

- Speed can not drop of $\geq 15\%$ below the original measured rpm.
- Current cannot increase $> 15\%$ of original measure current.
- Noise cannot $> 3\text{dB}$ over the original measure noise.

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
DG08FNL027	1044.00	2009/1/4	Nan Yang	Zenny Lei



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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BFB04512HHA-DV52
BFB04512HHA-CZ0T

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
1,431	2008/4/5 11:00 AM	2008/7/17 1:51 PM	56	0	5431.0
Representative Test P/N : BFB04512HHA-7G94			Current Test Status		<input type="checkbox"/> In process <input type="checkbox"/> In process (exceed requested) <input checked="" type="checkbox"/> Termination
Equipment: 1.Oven: E24-F0057					

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.	Current Spec.		Speed Spec.	Speed Spec.		Noise Spec.	Noise Spec.	
	(mA)	(mA)		(RPM)	(RPM)		(dB A)	(dB A)	
	260 Max.	260 Max.		5490-6710	5490-6710		41.0 Max	41.0 Max	3 dBMax.
1	154	146	-5.2	6241	6443	3.2	37.9	39.6	1.7
2	152	146	-3.9	6167	6422	4.1	37.5	39.8	2.3
3	155	147	-5.2	6068	6580	8.4	37.8	39.4	1.6
4	153	146	-4.6	6173	6418	4.0	37.9	39.7	1.8
5	154	146	-5.2	6226	6575	5.6	38.1	39.6	1.5
6	153	145	-5.2	6116	6564	7.3	37.6	38.7	1.1
7	156	145	-7.1	6261	6426	2.6	37.9	39.3	1.4
8	154	146	-5.2	6275	6591	5.0	37.5	39.7	2.2
9	156	147	-5.8	6181	6439	4.2	37.8	39.5	1.7
10	157	146	-7.0	6390	6578	2.9	37.5	39.2	1.7
11	158	147	-7.0	6159	6442	4.6	37.9	39.1	1.2
12	154	145	-5.8	6371	6531	2.5	37.5	38.5	1.0
13	158	146	-7.6	6186	6426	3.9	37.5	38.7	1.2
14	152	145	-4.6	6345	6548	3.2	38.0	39.0	1.0
15	162	146	-9.9	6258	6482	3.6	37.8	39.6	1.8
16	160	145	-9.4	6265	6532	4.3	37.9	39.3	1.4
17	155	146	-5.8	6247	6419	2.8	37.1	39.8	2.7
18	156	144	-7.7	6366	6585	3.4	37.9	39.2	1.3
19	159	145	-8.8	6293	6424	2.1	37.5	39.4	1.9
20	150	144	-4.0	6334	6481	2.3	37.9	39.7	1.8
21	158	145	-8.2	6142	6406	4.3	38.2	38.6	0.4
22	158	145	-8.2	6339	6553	3.4	37.3	39.0	1.7
23	156	146	-6.4	6380	6450	1.1	37.8	39.2	1.4
24	157	145	-7.6	6231	6446	3.5	37.6	38.9	1.3
25	158	146	-7.6	6448	6444	-0.1	37.5	39.1	1.6
26	158	144	-8.9	6217	6519	4.9	37.9	39.3	1.4
27	160	146	-8.8	5929	6376	7.5	37.7	38.7	1.0
28	156	146	-6.4	6356	6415	0.9	37.8	39.0	1.2
29	158	148	-6.3	6149	6514	5.9	37.6	39.3	1.7
30	159	147	-7.5	6372	6367	-0.1	37.9	39.7	1.8
31	154	146	-5.2	6291	6652	5.7	37.6	39.5	1.9
32	154	146	-5.2	6445	6441	-0.1	37.5	39.8	2.3
33	158	146	-7.6	6409	6471	1.0	37.8	39.6	1.8
34	159	146	-8.2	6267	6513	3.9	37.5	39.3	1.8
35	154	147	-4.5	6381	6431	0.8	37.8	39.7	1.9

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG08FNL027	1044.00	2009/1/4	Nan Yang	Zenny Lei



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BFB04512HHA-DV52	
BFB04512HHA-CZ0T	

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
1,431	2008/4/5 11:00 AM	2008/7/17 1:51 PM	56	0	5431.0

Representative Test P/N : BFB04512HHA-7G94	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-F0057

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. (mA) 260 Max.	Current Spec. (mA) 260 Max.		Speed Spec. (RPM) 5490-6710	Speed Spec. (RPM) 5490-6710		Noise Spec. (dB A) 41.0 Max	Noise Spec. (dB A) 41.0 Max	
36	157	145	-7.6	6281	6472	3.0	37.9	39.5	1.6
37	156	146	-6.4	6282	6457	2.8	37.5	40.2	2.7
38	155	146	-5.8	6281	6445	2.6	37.9	38.6	0.7
39	159	147	-7.5	6398	6489	1.4	38.2	39.4	1.2
40	156	146	-6.4	6496	6420	-1.2	37.5	38.7	1.2
41	158	145	-8.2	6317	6498	2.9	37.5	39.3	1.8
42	161	145	-9.9	6026	6411	6.4	37.6	39.4	1.8
43	158	145	-8.2	6249	6471	3.6	37.8	39.2	1.4
44	157	145	-7.6	6220	6401	2.9	37.4	39.1	1.7
45	158	148	-6.3	6355	6442	1.4	37.5	38.7	1.2
46	158	147	-7.0	6317	6582	4.2	37.5	39.6	2.1
47	157	147	-6.4	6375	6474	1.6	37.8	39.1	1.3
48	154	146	-5.2	6325	6517	3.0	37.6	39.7	2.1
49	154	147	-4.5	6188	6640	7.3	37.5	39.3	1.8
50	157	149	-5.1	6434	6490	0.9	37.8	38.9	1.1
51	157	149	-5.1	6325	6648	5.1	37.9	39.7	1.8
52	161	150	-6.8	6201	6550	5.6	37.6	39.1	1.5
53	157	148	-5.7	6257	6555	4.8	37.5	39.6	2.1
54	157	149	-5.1	6335	6531	3.1	37.2	39.2	2.0
55	160	149	-6.9	6304	6677	5.9	37.4	39.5	2.1
56	158	151	-4.4	6254	6561	4.9	37.0	39.7	2.7
X-Bar	156.6	146.3	-	6276.8	6493.5	-	37.67	39.30	-
σ	2.469	1.474	-	107.944	74.477	-	0.250	0.378	-

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