



# 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 BFB40x40x10 mm series as the right table	BFB0412HHA-A			
	BFB0412HA-A			
	BFB0405HHA-TZP4			

<b>Representative Test P/N :BFB0405HHA-A</b>	
<b>Equipment:1.Oven: E24-F0030</b>	<b>On/Off Cycles: Every 500 hours</b>

◎ **L<sub>10</sub> Expectancy: 30,000 hours minimum @ fan rated voltage and the temperature of 40°C**  
 According to the equation for **Weibull distribution**, **MTTF ≐ 7×L<sub>10</sub> = 210,000 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<sub>r,c</sub>) 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 <sub>s</sub> (°C) ( Actual Test Temperature )	Unstress Temperature T <sub>u</sub> (°C)	Acceleration Factor A <sub>F</sub>	Quantity of Test Devices n (pcs)	Poisson Distribution Factor B <sub>r,c</sub>	Required test time with zero failure t (hours)	Actual test time with zero failure t (hours)	Verified MTTF 40 °C (hours)	Verified L <sub>10</sub> 40 °C (hours)
70	40	8.00	56	2.303	1,490	1,491.0	210,074	30,011

### Test Progress:

Date for Test Beginning	Date for Test Termination (at	Current Test Status			Current Total Test Time (hours)
2006/6/20 2:00 PM	2006/8/29 1:28 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	1491.0

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' L<sub>10</sub> 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 <sub>F</sub>	Estimated MTTF (hours)	Estimated L <sub>10</sub> (hours)
25	22.63	594,178	84,883
30	16.00	420,147	60,021
40	8.00	210,074	30,011
50	4.00	105,037	15,005
60	2.00	52,518	7,503
70	1.00	26,259	3,751

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

<b>Test Result</b>	<input checked="" type="checkbox"/> <b>Accept</b>
	<input type="checkbox"/> <b>Reject</b>

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG06FNL141	189.00	2006/8/29 2:00 PM	Nan.Yang	Gx.Xu



# DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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BFB0412HHA-A				
BFB0412HA-A				
BFB0405HHA-TZP4				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
1,490	2006/6/20 2:00 PM	2006/8/29 1:28 PM	56	0	<b>1491.0</b>

Representative Test P/N :BFB0405HHA-A	Current Test Status	In process <input type="checkbox"/>	process (exceed requested) <input checked="" type="checkbox"/>	Termination <input type="checkbox"/>
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Equipment: 1.Oven: E24-F0030 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.	Current Spec.		Speed Spec.	Speed Spec.		Noise Spec.	Noise Spec.	
	( mA ) <b>240Max.</b>	( mA ) <b>240Max.</b>		( RPM ) <b>7225-9350</b>	( RPM ) <b>7225-9350</b>		( dB A ) <b>40.5Max</b>	( dB A ) <b>40.5Max</b>	
1	174	174	0.0	8021	8266	3.1	34.7	35.7	2.9
2	172	176	2.3	8251	8227	-0.3	34.5	35.9	4.1
3	188	177	-5.9	7978	8236	3.2	34.9	35.4	1.4
4	182	177	-2.7	8466	8180	-3.4	35.2	35.6	1.1
5	173	174	0.6	8325	8253	-0.9	34.4	35.8	4.1
6	184	176	-4.3	7937	8411	6.0	34.7	35.3	1.7
7	181	177	-2.2	8220	8147	-0.9	34.3	36.2	5.5
8	172	173	0.6	7739	8305	7.3	34.8	35.6	2.3
9	189	169	-10.6	8024	7976	-0.6	34.4	36.0	4.7
10	178	176	-1.1	7752	8063	4.0	34.7	35.7	2.9
11	178	174	-2.2	7826	8310	6.2	35.1	35.9	2.3
12	170	181	6.5	8486	8113	-4.4	34.5	35.6	3.2
13	176	175	-0.6	7778	8465	8.8	34.9	35.3	1.1
14	169	177	4.7	7938	8122	2.3	34.4	36.1	4.9
15	173	174	0.6	8210	8213	0.0	34.7	35.9	3.5
16	185	177	-4.3	8315	8237	-0.9	34.8	35.7	2.6
17	186	175	-5.9	8251	8190	-0.7	34.4	35.9	4.4
18	182	178	-2.2	8323	8238	-1.0	34.9	35.5	1.7
19	173	174	0.6	8039	8198	2.0	34.7	36.2	4.3
20	186	176	-5.4	7952	8104	1.9	35.3	35.8	1.4
21	181	174	-3.9	8407	8340	-0.8	34.8	35.4	1.7
22	175	175	0.0	8210	8211	0.0	34.5	36.1	4.6
23	188	183	-2.7	7827	8186	4.6	34.9	35.9	2.9
24	190	175	-7.9	7874	8088	2.7	34.1	35.4	3.8
25	166	176	6.0	8234	8288	0.7	34.8	35.7	2.6
26	183	175	-4.4	8460	8222	-2.8	34.6	35.5	2.6
27	174	176	1.1	8220	8215	-0.1	34.8	35.9	3.2
28	186	173	-7.0	8087	8283	2.4	35.0	35.4	1.1
29	175	176	0.6	7750	8247	6.4	34.3	36.0	5.0
30	170	176	3.5	8161	8150	-0.1	34.8	35.8	2.9
31	183	176	-3.8	8309	8202	-1.3	34.5	35.9	4.1
32	167	170	1.8	8216	8203	-0.2	34.9	35.4	1.4
33	193	180	-6.7	8624	8152	-5.5	34.6	36.2	4.6
34	176	172	-2.3	8172	8735	6.9	35.1	35.7	1.7
35	184	181	-1.6	8215	8569	4.3	34.9	36.1	3.4

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Equipment: 1.Oven: E24-F0030 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. (mA) <b>240Max.</b>	Current Spec. (mA) <b>240Max.</b>		Speed Spec. (RPM) <b>7225-9350</b>	Speed Spec. (RPM) <b>7225-9350</b>		Noise Spec. (dB A) <b>40.5Max</b>	Noise Spec. (dB A) <b>40.5Max</b>	
36	174	176	1.1	8088	8269	2.2	34.7	36.1	4.0
37	185	166	-10.3	8136	8268	1.6	34.7	35.3	1.7
38	167	177	6.0	8200	8125	-0.9	35.3	35.6	0.8
39	173	176	1.7	8176	8154	-0.3	34.5	35.9	4.1
40	163	177	8.6	7938	8155	2.7	34.9	35.4	1.4
41	199	209	5.0	8614	8711	1.1	34.6	35.9	3.8
42	185	174	-5.9	8400	8300	-1.2	34.8	36.1	3.7
43	181	172	-5.0	8355	8323	-0.4	34.3	35.4	3.2
44	189	180	-4.8	8052	8164	1.4	34.9	36.0	3.2
45	189	177	-6.3	7995	8306	3.9	34.5	35.8	3.8
46	183	178	-2.7	8213	8307	1.1	35.0	35.4	1.1
47	176	180	2.3	8000	7926	-0.9	34.7	35.7	2.9
48	176	174	-1.1	7749	8222	6.1	34.4	35.5	3.2
49	182	176	-3.3	8303	8173	-1.6	35.5	36.1	1.7
50	184	179	-2.7	8062	8210	1.8	34.8	35.7	2.6
51	173	175	1.2	8312	8286	-0.3	35.1	36.2	3.1
52	178	169	-5.1	8302	8261	-0.5	34.7	35.9	3.5
53	184	176	-4.3	8301	8226	-0.9	34.5	35.4	2.6
54	181	174	-3.9	8263	8238	-0.3	34.9	35.6	2.0
55	182	175	-3.8	8183	8125	-0.7	34.7	36.0	3.7
56	181	174	-3.9	8344	8235	-1.3	35.1	35.7	1.7
X-Bar	179.411	176.107	-	8153.3	8238.0	-	34.74	35.75	-
$\sigma$	7.419	5.379	-	218.776	139.304	-	0.282	0.272	-

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