



# 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 BFB45x45x10.0mm series as the right table	BFB04512HA-C	BFB04505HHA-C			
	BFB04512MA-C	BFB04505HA-C			
	BFB04512LA-C	BFB04505MA-C			
		BFB04505LA-C			

**Representative Test P/N : BFB04512HHA-C**

**Equipment: 1.Oven: E24-F0058 ; 2. DC Source: E11-FD426**      On/Off Cycles: Every 500 hours

© **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 Ts (°C) ( Actual Test Temperature )	Unstress Temperature Tu (°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 least)	Current Test Status			Current Total Test Time (hours)
2007/3/21 3:40 PM	2007/5/28 1:08 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. Speed can not drop of ≥ 15% below the original measured rpm.
2. Current cannot increase > 15% of original measure current.
3. Noise cannot >3dB over the original measure noise.

<b>Test Result</b>	<input checked="" type="checkbox"/> <b>Accept</b> <input type="checkbox"/> <b>Reject</b>
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QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG07FNL053	139.00	2007/5/27	Nan Yang	Gx Xu



# DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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	BFB04512HA-C	BFB04505HHA-C	
	BFB04512MA-C	BFB04505HA-C	
	BFB04512LA-C	BFB04505MA-C	
		BFB04505LA-C	

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
1,490	2007/3/21 3:40 PM	2007/5/28 1:08 PM	56	0	<b>1491.0</b>

Representative Test P/N : BFB04512HHA-C	<b>Current Test Status</b>	<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-F0058 ; 2. DC Source: E11-FD426 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>260 Max.</b>	Current Spec. ( mA ) <b>260 Max.</b>		Speed Spec. ( RPM ) <b>5310-6372</b>	Speed Spec. ( RPM ) <b>5310-6372</b>		Noise Spec. ( dB A ) <b>40.5Max</b>	Noise Spec. ( dB A ) <b>40.5Max</b>	
1	120	128	6.7	5353	5884	9.9	33.7	35.9	2.2
2	118	113	-4.2	5329	5851	9.8	34.1	36.1	2.0
3	118	126	6.8	5385	5836	8.4	34.3	35.5	1.2
4	119	129	8.4	5401	5553	2.8	34.2	35.8	1.6
5	119	112	-5.9	5533	5980	8.1	34.0	36.2	2.2
6	118	126	6.8	5486	6026	9.8	33.7	36.4	2.7
7	121	112	-7.4	5468	5967	9.1	34.1	36.9	2.8
8	117	125	6.8	5364	5887	9.8	33.6	36.0	2.4
9	119	112	-5.9	5332	5786	8.5	33.9	35.5	1.6
10	137	131	-4.4	5578	5859	5.0	34.1	36.1	2.0
11	120	128	6.7	5420	5767	6.4	33.7	35.8	2.1
12	120	112	-6.7	5402	5876	8.8	34.0	35.4	1.4
13	114	116	1.8	5390	5840	8.3	33.9	35.9	2.0
14	117	114	-2.6	5513	5876	6.6	34.3	36.2	1.9
15	118	110	-6.8	5465	5865	7.3	34.1	35.4	1.3
16	124	136	9.7	5369	5750	7.1	33.6	35.7	2.1
17	118	127	7.6	5417	5867	8.3	33.8	35.5	1.7
18	117	114	-2.6	5589	5981	7.0	34.3	36.1	1.8
19	120	123	2.5	5370	5812	8.2	33.9	35.4	1.5
20	117	124	6.0	5600	6150	9.8	34.1	35.9	1.8
21	120	114	-5.0	5449	5936	8.9	33.8	35.1	1.3
22	115	123	7.0	5317	5755	8.2	33.5	35.8	2.3
23	121	109	-9.9	5388	5860	8.8	33.7	36.1	2.4
24	116	124	6.9	5472	5933	8.4	34.2	35.5	1.3
25	121	112	-7.4	5359	5882	9.8	34.0	35.9	1.9
26	117	114	-2.6	5355	5785	8.0	33.5	35.4	1.9
27	120	124	3.3	5363	5856	9.2	33.9	35.7	1.8
28	118	123	4.2	5400	5902	9.3	34.1	35.3	1.2
29	120	114	-5.0	5348	5816	8.8	33.5	36.3	2.8
30	117	121	3.4	5358	5867	9.5	33.8	35.5	1.7
31	117	123	5.1	5496	5789	5.3	33.9	35.9	2.0
32	119	125	5.0	5425	5755	6.1	34.1	35.3	1.2
33	117	124	6.0	5513	5909	7.2	34.2	36.2	2.0
34	138	126	-8.7	5663	5875	3.7	34.3	35.7	1.4
35	117	123	5.1	5615	5951	6.0	34.0	36.4	2.4

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG07FNL053	139.00	2007/5/27	Nan Yang	Gx Xu



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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)
1,490	2007/3/21 3:40 PM	2007/5/28 1:08 PM	56	0	<b>1491.0</b>

Representative Test P/N : BFB04512HHA-C	<b>Current Test Status</b>	<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-F0058 ; 2. DC Source: E11-FD426 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 )	( mA )		( RPM )	( RPM )		( dB A )	( dB A )	
	<b>260 Max.</b>	<b>260 Max.</b>		<b>5310-6372</b>	<b>5310-6372</b>		<b>40.5Max</b>	<b>40.5Max</b>	<b>3 dBMax.</b>
36	121	126	4.1	5402	5843	8.2	33.5	35.4	1.9
37	118	129	9.3	5478	5818	6.2	33.6	35.9	2.3
38	123	127	3.3	5348	5788	8.2	34.0	35.7	1.7
39	114	113	-0.9	5612	5926	5.6	34.2	36.1	1.9
40	128	137	7.0	5375	5804	8.0	33.8	35.5	1.7
41	118	113	-4.2	5549	5888	6.1	33.9	35.8	1.9
42	117	114	-2.6	5390	5871	8.9	33.4	35.4	2.0
43	116	110	-5.2	5499	5816	5.8	34.2	35.7	1.5
44	116	112	-3.4	5571	6053	8.7	34.2	36.0	1.8
45	121	126	4.1	5406	5829	7.8	33.8	36.2	2.4
46	118	121	2.5	5431	5758	6.0	33.6	35.9	2.3
47	116	125	7.8	5578	5828	4.5	34.2	35.4	1.2
48	120	126	5.0	5385	5786	7.4	33.7	35.7	2.0
49	117	113	-3.4	5637	5840	3.6	34.1	36.2	2.1
50	120	128	6.7	5436	5902	8.6	34.3	35.9	1.6
51	116	114	-1.7	5494	5780	5.2	34.0	35.5	1.5
52	119	126	5.9	5392	5854	8.6	33.8	36.2	2.4
53	117	112	-4.3	5485	5918	7.9	33.6	35.9	2.3
54	120	110	-8.3	5537	5888	6.3	34.1	35.4	1.3
55	116	114	-1.7	5606	5941	6.0	33.5	35.7	2.2
56	119	127	6.7	5347	5877	9.9	33.6	35.5	1.9
X-Bar	119.2	120.4	-	5450.8	5862.4	-	33.91	35.80	-
$\sigma$	4.290	7.345	-	92.854	88.299	-	0.259	0.352	-

QE File No.	Time-out for function test or others (hrs)	Issued Date	Reported By	Approved By
<b>DG07FNL053</b>	<b>139.00</b>	<b>2007/5/27</b>	<b>Nan Yang</b>	<b>Gx Xu</b>