



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 BFB45x45x10 mm series as the right table	BFB04505HHA	BFB04505HA	BFB04505MA	BFB04505LA
	BFB04512HH	BFB04512HA	BFB04512MA	BFB04512LA

Representative Test P/N :BFB04505HHA-A

Equipment:1.Oven: E24-F0030 On/Off Cycles: Every 500 hours

◎ **L₁₀ Expectancy: 30,000** hours minimum @ fan rated voltage and the temperature of 40°C
 According to the equation for **Weibull distribution**, **MTTF ≐ 7×L10 = 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_{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	1,490	1,490.0	209,933	29,990

Test Progress:

Date for Test Beginning	Date for Test Termination (at)	Current Test Status			Current Total Test Time (hours)
2006/5/26 2:00 PM	2006/7/28 2:28 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	1490.0

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	593,779	84,826
30	16.00	419,865	59,981
40	8.00	209,933	29,990
50	4.00	104,966	14,995
60	2.00	52,483	7,498
70	1.00	26,242	3,749

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 **Accept**
 Reject

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG06FNL109	22.00	2006/7/28 2:00 PM	Nan.Yang	gx.xu



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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	BFB04512HHA	BFB04512HA	BFB04512MA	BFB04512LA	

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
1,490	2006/5/26 2:00 PM	2006/7/28 2:28 PM	56	0	1490.0

Representative Test P/N :BFB04505HHA-A	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-F0030	On/Off Cycles: Every 500 hours
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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. (mA)	Current Spec. (mA)		Speed Spec. (RPM)	Speed Spec. (RPM)		Noise Spec. (dB A)	Noise Spec. (dB A)	
	240Max.	240Max.		5525-7150	5525-7150		40.5Max	40.5Max	
1	127	135	6.3	5870	5749	-2.1	34.5	35.7	3.5
2	130	128	-1.5	5923	5928	0.1	34.7	35.4	2.0
3	124	131	5.6	5859	5870	0.2	34.2	35.8	4.7
4	126	127	0.8	5852	5888	0.6	34.6	35.4	2.3
5	128	133	3.9	5887	5935	0.8	34.2	34.9	2.0
6	133	139	4.5	5920	5921	0.0	34.7	35.7	2.9
7	126	126	0.0	6009	6037	0.5	34.3	35.6	3.8
8	129	136	5.4	5803	5794	-0.2	34.6	36.0	4.0
9	119	128	7.6	6322	5939	-6.1	34.9	35.4	1.4
10	128	135	5.5	5927	5957	0.5	34.2	35.9	5.0
11	127	129	1.6	5966	5874	-1.5	34.6	35.6	2.9
12	127	134	5.5	5906	5957	0.9	34.3	35.1	2.3
13	124	134	8.1	6027	5885	-2.4	34.8	35.6	2.3
14	124	129	4.0	5936	5935	0.0	34.1	35.3	3.5
15	128	129	0.8	5695	5691	-0.1	34.5	35.3	2.3
16	119	128	7.6	6336	5754	-9.2	35.0	35.8	2.3
17	123	127	3.3	6083	5987	-1.6	34.3	35.6	3.8
18	125	132	5.6	5796	5876	1.4	34.7	35.9	3.5
19	125	133	6.4	5923	5907	-0.3	35.1	35.4	0.9
20	129	130	0.8	5885	5903	0.3	34.4	35.7	3.8
21	125	130	4.0	5951	5825	-2.1	34.8	35.7	2.6
22	124	128	3.2	6103	5971	-2.2	34.3	35.4	3.2
23	129	130	0.8	5971	6022	0.9	34.7	35.9	3.5
24	128	135	5.5	5965	5985	0.3	34.5	34.8	0.9
25	127	134	5.5	6058	6043	-0.2	35.0	36.6	4.6
26	121	126	4.1	6267	5949	-5.1	34.9	35.9	2.9
27	127	134	5.5	5925	5949	0.4	34.3	35.3	2.9
28	125	128	2.4	5985	5844	-2.4	34.7	36.1	4.0
29	130	139	6.9	5935	5718	-3.7	34.7	35.4	2.0
30	129	136	5.4	5975	5908	-1.1	34.9	35.7	2.3
31	124	128	3.2	6093	5933	-2.6	34.2	36.1	5.6
32	128	135	5.5	5922	5858	-1.1	34.5	34.9	1.2
33	127	136	7.1	5871	5902	0.5	34.7	35.9	3.5
34	123	128	4.1	6024	5950	-1.2	34.3	35.4	3.2
35	122	125	2.5	5952	5983	0.5	34.6	35.7	3.2

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG06FNL109	22.00	2006/7/28 2:00 PM	Nan.Yang	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)
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Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)
	Current Spec. (mA)	Current Spec. (mA)		Speed Spec. (RPM)	Speed Spec. (RPM)		Noise Spec. (dB A)	Noise Spec. (dB A)	
	240Max.	240Max.		5525-7150	5525-7150		40.5Max	40.5Max	
36	122	125	2.5	5905	5904	0.0	34.2	35.6	4.1
37	130	138	6.2	5859	5921	1.1	34.3	35.9	4.7
38	126	129	2.4	5959	5785	-2.9	34.8	35.6	2.3
39	124	133	7.3	6009	5824	-3.1	34.4	35.6	3.5
40	127	136	7.1	6025	5896	-2.1	34.7	36.1	4.0
41	123	128	4.1	6237	5919	-5.1	34.3	35.7	4.1
42	127	134	5.5	5854	5890	0.6	34.6	35.6	2.9
43	127	129	1.6	5834	5796	-0.7	34.3	35.6	3.8
44	124	128	3.2	5981	5940	-0.7	34.7	36.2	4.3
45	126	129	2.4	6033	5862	-2.8	34.3	34.9	1.7
46	127	137	7.9	5907	5747	-2.7	34.8	35.7	2.6
47	128	129	0.8	5837	5851	0.2	34.3	35.4	3.2
48	126	137	8.7	6162	5752	-6.7	34.7	36.8	6.1
49	128	127	-0.8	5849	5942	1.6	34.3	35.7	4.1
50	126	134	6.3	5916	5862	-0.9	34.8	36.0	3.4
51	126	134	6.3	5905	5950	0.8	34.4	35.4	2.9
52	129	130	0.8	5914	5932	0.3	34.7	35.8	3.2
53	123	132	7.3	5922	5801	-2.0	34.4	35.5	3.2
54	123	126	2.4	6072	5908	-2.7	34.1	36.0	5.6
55	124	132	6.5	5961	5889	-1.2	34.7	35.7	2.9
56	131	139	6.1	5978	5876	-1.7	34.4	35.4	2.9
X-Bar	126.018	131.446	-	5965.0	5890.6	-	34.54	35.64	-
σ	2.832	3.935	-	123.953	78.636	-	0.254	0.375	-

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