



# 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 97x94x33 mm series as the right table	BFB1024H	BFB1024M	BFB1012HH-TP48		
	BFB1024HH	BFB1012L			
	BFB1012H	BFB1024M			
	BFB1012M	BFB1012MX01			

**Representative Test P/N : BFB1012HH**

**Equipment: 1.Oven: E24-T0170** On/Off Cycles: Every 500 hours

⊙ **L<sub>10</sub> Expectancy: 50,000 hours minimum @ fan rated voltage and the temperature of 40°C**

According to the equation for **Weibull distribution**, **MTTF ≅ 7×L10 = 350,000 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)	Unstress Temperature T <sub>u</sub> (°C)	Acceleration Factor A <sub>F</sub>	Quantity of Test Devices (pcs) n	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	19	2.303	6,643	12,042.0	634,464	90,638

### Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
1998/8/17 1:00 PM	1999/5/21 7:55 AM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	12042.0

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	1,794,536	256,362
30	16.00	1,268,928	181,275
40	8.00	634,464	90,638
50	4.00	317,232	45,319
60	2.00	158,616	22,659
70	1.00	79,308	11,330

- Fan permission criteria for the measurement after test :
- Speed can not drop of ≥ 15% below the original measured rpm.
  - Current cannot increase > 15% of original measure current.
  - Noise cannot >3dB over the original measure noise.

**Test Result**

**Accept**

**Reject**

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
A113L	2840.00	2000/4/28 3:00PM	<i>Bonnie Chang</i>	<i>Bob Sun</i>



# DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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	BFB1024HH	BFB1012L			
	BFB1012H	BFB1024M			
	BFB1012M	BFB1012MX01			

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
6,643	1998/8/17 1:00 PM	1999/5/21 7:55 AM	19	0	<b>12042.0</b>

Representative Test P/N : BFB1012HH	<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-T0170 On/Off Cycles: Every 500 hours

### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (mA)	Final Test Current Spec. (mA)	Deviation (%)	Initial Test Speed Spec. (RPM)	Final Test Speed Spec. (RPM)	Deviation (%)	Initial Test Noise Spec. (dB A)	Final Test Noise Spec. (dB A)	Deviation
	<b>1.65 Max.</b>	<b>1.65 Max.</b>		<b>4000Ref.</b>	<b>4000Ref.</b>		<b>58.0 Max</b>	<b>61.0 Max</b>	
1	1.02	1.02	0.0	4011	4084	1.8	56.0	55.7	-0.3
2	1.02	1.01	-1.0	4257	4292	0.8	57.4	56.9	-0.5
3	1.03	1.01	-1.9	4154	4221	1.6	56.8	56.3	-0.5
4	1.04	1.02	-1.9	4134	4191	1.4	56.3	57.2	0.9
5	1.01	1.00	-1.0	4135	4196	1.5	56.9	56.2	-0.7
6	1.08	1.07	-0.9	4043	4043	0.0	56.4	55.6	-0.8
7	1.03	1.01	-1.9	4094	4146	1.3	56.1	56.1	0.0
8	1.07	1.05	-1.9	4196	4201	0.1	56.8	56.9	0.1
9	1.08	1.07	-0.9	4102	4159	1.4	55.6	55.1	-0.5
10	1.03	1.01	-1.9	4106	4128	0.5	56.3	54.8	-1.5
11	1.04	1.03	-1.0	4233	4293	1.4	57.3	56.3	-1.0
12	1.02	1.00	-2.0	4112	4172	1.5	56.5	55.1	-1.4
13	1.13	1.13	0.0	4058	4143	2.1	56.4	55.5	-0.9
14	1.03	1.01	-1.9	4128	4169	1.0	56.2	56.2	0.0
15	1.10	1.09	-0.9	4012	4080	1.7	56.0	55.5	-0.5
16	1.02	1.01	-1.0	4123	4181	1.4	56.5	56.2	-0.3
17	1.01	1.00	-1.0	4043	4134	2.3	56.1	55.6	-0.5
18	1.02	1.02	0.0	4147	4242	2.3	56.8	56.6	-0.2
19	1.15	1.14	-0.9	4102	4145	1.0	56.8	56.1	-0.7
X-Bar	1.0	1.0	-	4115.3	4169.5	-	56.48	55.99	-
σ	0.041	0.043	-	66.707	65.291	-	0.459	0.654	-

QE File No.	Time-out for function test or others (hrs)	Issued Date	Reported By	Approved By
A113L	2840.00	2000/4/28 3:00PM	<i>Bonnie Chung</i>	<i>Robert Sun</i>