



# 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 <b>BFB97x94x33</b> series as the right table	<b>BFB1012HH</b>	<b>BFB1012H</b>	<b>BFB1012M</b>	<b>BFB1012L</b>	
	<b>BFB1024HH</b>	<b>BFB1024H</b>	<b>BFB1024M</b>	<b>BFB1024L</b>	
<b>Representative Test P/N : BFB1012HH</b>					
<b>Instruments used:</b> 1. Oven: F00-5, E24-T067 2. DC Source: GW GPC-3060D			On/Off Cycles: Every 500 hours		

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

According to the equation for **Weibull distribution**, **MTTF 7×L<sub>10</sub> = 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%), and

Stress/Elevated Temperature T <sub>s</sub> ( )	Unstress Temperature T <sub>u</sub> ( )	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 (hours)	Verified L <sub>10</sub> (hours)
<b>70</b>	<b>40</b>	<b>8.00</b>	<b>19</b>	<b>2.303</b>	<b>6,643</b>	<b>12,042</b>	634,464	90,638

## Test Progress:

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

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. **Basically, MTBF is equal to MTTF, they use same formula to work out a life data.** )

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

Temperature for MTTF Estimation ( )	Acceleration Factor A <sub>F</sub>	Estimated MTTF (hours)	Estimated L <sub>10</sub> (hours)
<b>25</b>	<b>22.63</b>	<b>1,794,536</b>	<b>256,362</b>
<b>30</b>	<b>16.00</b>	<b>1,268,928</b>	<b>181,275</b>
<b>40</b>	<b>8.00</b>	<b>634,464</b>	<b>90,638</b>
<b>50</b>	<b>4.00</b>	<b>317,232</b>	<b>45,319</b>
<b>60</b>	<b>2.00</b>	<b>158,616</b>	<b>22,659</b>
<b>70</b>	<b>1.00</b>	<b>79,308</b>	<b>11,330</b>

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



# DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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	BFB1024HH	BFB1024H	BFB1024M	BFB1024L	

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	12042.0

representative Test P/N : BFB1012HH	<b>Current Test Status</b>	<input type="checkbox"/> In process <i style="color: red;">In process</i>	<input type="checkbox"/> In process <i>(exceed requested)</i>	<input checked="" type="checkbox"/> Termination
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Instruments used: 1.Oven: F00-5, E24-T067 2. DC Source: GW GPC-3060D On/Off Cycles: Every 500 hours

## Test Data Between Initial Test and Final Test

sample P/N: BFB1012HH

Sample No.	Initial Test	Final Test	Deviation	Initial Test	Final Test	Deviation	Initial Test	Final Test	Deviation
	Current Spec. ( A ) <b>1.65 Max.</b>	Current Spec. ( A ) <b>1.65 Max.</b>		%	Speed Spec. ( RPM ) <b>4000 Ref.</b>		Speed Spec. ( RPM ) <b>4000-15%</b>	%	
1	1.02	1.02	0.0	4011	4166	3.9	56.0	56.9	1.6
2	1.02	1.02	0.0	4257	4348	2.1	57.4	57.8	0.7
3	1.03	1.02	-1.0	4154	4286	3.2	56.8	57.5	1.2
4	1.04	1.03	-1.0	4134	4225	2.2	56.3	57.2	1.6
5	1.01	1.00	-1.0	4135	4225	2.2	56.9	57.6	1.2
6	1.08	1.08	0.0	4043	4166	3.0	56.4	56.9	0.9
7	1.03	1.01	-1.9	4094	4225	3.2	56.1	57.2	2.0
8	1.07	1.05	-1.9	4196	4286	2.1	56.8	57.5	1.2
9	1.08	1.07	-0.9	4102	4166	1.6	55.6	56.9	2.3
10	1.03	1.01	-1.9	4106	4225	2.9	56.3	57.2	1.6
11	1.04	1.03	-1.0	4233	4286	1.3	57.3	57.5	0.3
12	1.02	1.00	-2.0	4112	4225	2.7	56.5	57.2	1.2
13	1.13	1.12	-0.9	4058	4166	2.7	56.4	56.9	0.9
14	1.03	1.01	-1.9	4128	4225	2.3	56.2	57.2	1.8
15	1.10	1.08	-1.8	4012	4109	2.4	56.0	56.6	1.1
16	1.02	1.01	-1.0	4123	4225	2.5	56.5	57.2	1.2
17	1.01	0.99	-2.0	4043	4166	3.0	56.1	56.8	1.2
18	1.02	1.00	-2.0	4147	4248	2.4	56.8	57.3	0.9
19	1.15	1.13	-1.7	4102	4166	1.6	56.8	56.9	0.2
X-Bar	1.049	1.036	-	4115	4218	-	56.5	57.2	-
	0.041	0.041	-	66.707	57.791	-	0.459	0.312	-

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