



# 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 AFB120x120x38 mm series as the right table	ABF1248HE			
	AFB1248ME			
	AFB1248LE			

<b>Representative Test P/N :AFB1248HE</b>	
<b>Equipment: 1.Oven: E24-F0055</b>	On/Off Cycles: Every 500 hours

◎ **L<sub>10</sub> Expectancy: 70,000 hours minimum @ fan rated voltage and the temperature of 40°C**

According to the equation for **Weibull distribution**,  $MTTF \cong 7 \times L_{10} = 490,000$  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,

$$t = 1.036 \times MTTF \times [(B_{r;c}) \div n]^{0.91} \div A_F, \text{ and } A_F = 2^{(T_s - T_u)/10}$$

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> (°C)	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)
60	40	4.00	56	2.303	6,956	6,956.0	490,031	70,004

### Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2003/7/1 8:00 PM	2004/8/6 9:33 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	6956.0

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	11.31	1,386,017	198,002
30	8.00	980,062	140,009
40	4.00	490,031	70,004
50	2.00	245,015	35,002
60	1.00	122,508	17,501

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	Issued Date	Reported By	Approved By
DG03FNL082	2694.00	2004/8/6 10:00 PM	Huiling.Fu	Even.Liu

Note: The test sample equivalent to HUAWEI, Part number AFB1248HE.



# DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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applies to AFB120x120x38 mm series as the right table

ABF1248HE			
AFB1248ME			
AFB1248LE			

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
6,956	2003/7/1 8:00 PM	2004/8/6 9:33 PM	56	0	<b>6956.0</b>

Representative Test P/N :AFB1248HE	<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-F0055 On/Off Cycles: Every 500 hours

### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. ( A ) <b>0.18Max.</b>	Final Test Current Spec. ( A ) <b>0.18Max.</b>	Deviation (%)	Initial Test Speed Spec. ( RPM ) <b>2392-2808</b>	Final Test Speed Spec. ( RPM ) <b>2392-2808</b>	Deviation (%)	Initial Test Noise Spec. ( dB A ) <b>44.0Max</b>	Final Test Noise Spec. ( dB A ) <b>44.0Max</b>	Deviation (%)
1	0.09	0.09	0.0	2552	2579	1.1	43.8	43.5	-0.7
2	0.08	0.09	12.5	2547	2565	0.7	43.0	43.2	0.5
3	0.08	0.09	12.5	2569	2640	2.8	42.7	42.5	-0.5
4	0.08	0.08	0.0	2596	2529	-2.6	42.9	42.9	0.0
5	0.08	0.09	12.5	2574	2607	1.3	43.1	42.7	-0.9
6	0.09	0.09	0.0	2676	2566	-4.1	42.4	42.4	0.0
7	0.08	0.09	12.5	2570	2582	0.5	42.6	42.3	-0.7
8	0.08	0.08	0.0	2533	2550	0.7	42.8	42.6	-0.5
9	0.08	0.09	12.5	2537	2595	2.3	43.0	43.1	0.2
10	0.08	0.09	12.5	2549	2514	-1.4	43.2	43.2	0.0
11	0.09	0.08	-11.1	2631	2704	2.8	42.2	42.2	0.0
12	0.09	0.08	-11.1	2579	2555	-0.9	42.5	42.3	-0.5
13	0.08	0.08	0.0	2666	2571	-3.6	42.7	42.7	0.0
14	0.09	0.08	-11.1	2569	2586	0.7	42.8	42.8	0.0
15	0.08	0.08	0.0	2572	2571	0.0	42.9	42.9	0.0
16	0.08	0.09	12.5	2557	2574	0.7	41.2	42.0	1.9
17	0.08	0.08	0.0	2597	2587	-0.4	43.0	43.0	0.0
18	0.08	0.08	0.0	2574	2561	-0.5	42.0	42.1	0.2
19	0.08	0.09	12.5	2549	2522	-1.1	42.5	42.5	0.0
20	0.08	0.08	0.0	2537	2561	0.9	41.4	42.3	2.2
21	0.08	0.09	12.5	2592	2559	-1.3	42.3	42.3	0.0
22	0.08	0.08	0.0	2654	2595	-2.2	42.3	42.1	-0.5
23	0.08	0.09	12.5	2572	2538	-1.3	42.1	42.1	0.0
24	0.08	0.08	0.0	2596	2536	-2.3	42.6	42.6	0.0
25	0.08	0.08	0.0	2539	2536	-0.1	43.2	42.9	-0.7
26	0.09	0.09	0.0	2764	2619	-5.2	42.8	42.6	-0.5
27	0.09	0.09	0.0	2539	2549	0.4	42.5	42.5	0.0
28	0.08	0.08	0.0	2576	2552	-0.9	42.4	42.6	0.5
29	0.08	0.08	0.0	2533	2542	0.4	42.3	42.3	0.0
30	0.08	0.08	0.0	2529	2542	0.5	42.1	42.0	-0.2
31	0.08	0.09	12.5	2547	2556	0.4	43.0	43.0	0.0
32	0.08	0.09	12.5	2694	2560	-5.0	43.2	42.5	-1.6
33	0.09	0.09	0.0	2592	2568	-0.9	42.8	42.8	0.0
34	0.08	0.08	0.0	2517	2501	-0.6	42.6	42.5	-0.2
35	0.08	0.09	12.5	2564	2570	0.2	42.4	42.4	0.0

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG03FNL082	2694.00	2004/8/6 10:00 PM	Huling.Fu	Even.Liu



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	<b>AFB1248ME</b>			
	<b>AFB1248LE</b>			

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
6,956	2003/7/1 8:00 PM	2004/8/6 9:33 PM	56	0	<b>6956.0</b>

Representative Test P/N :AFB1248HE	<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-F0055	On/Off Cycles: Every 500 hours
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### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec.	Final Test Current Spec.	Deviation (%)	Initial Test Speed Spec.	Final Test Speed Spec.	Deviation (%)	Initial Test Noise Spec.	Final Test Noise Spec.	Deviation (%)
	( A ) <b>0.18Max.</b>	( A ) <b>0.18Max.</b>		( RPM ) <b>2392-2808</b>	( RPM ) <b>2392-2808</b>		( dB A ) <b>44.0Max</b>	( dB A ) <b>44.0Max</b>	
36	0.09	0.09	0.0	2539	2510	-1.1	42.7	42.7	0.0
37	0.08	0.09	12.5	2546	2590	1.7	43.2	43.1	-0.2
38	0.08	0.08	0.0	2592	2571	-0.8	43.1	43.1	0.0
39	0.09	0.09	0.0	2577	2575	-0.1	42.6	42.4	-0.5
40	0.08	0.08	0.0	2549	2571	0.9	43.0	43.0	0.0
41	0.09	0.09	0.0	2572	2532	-1.6	42.3	42.6	0.7
42	0.08	0.09	12.5	2569	2569	0.0	42.2	42.5	0.7
43	0.08	0.08	0.0	2525	2575	2.0	42.5	42.1	-0.9
44	0.08	0.08	0.0	2576	2526	-1.9	42.1	42.2	0.2
45	0.08	0.09	12.5	2794	2548	-8.8	42.6	42.5	-0.2
46	0.09	0.08	-11.1	2592	2537	-2.1	42.7	42.7	0.0
47	0.08	0.09	12.5	2601	2507	-3.6	42.3	42.3	0.0
48	0.09	0.08	-11.1	2621	2548	-2.8	42.5	42.7	0.5
49	0.09	0.09	0.0	2597	2612	0.6	43.0	43.2	0.5
50	0.08	0.08	0.0	2574	2598	0.9	42.3	42.3	0.0
51	0.08	0.09	12.5	2566	2536	-1.2	42.4	42.6	0.5
52	0.09	0.09	0.0	2572	2579	0.3	43.5	43.8	0.7
53	0.08	0.09	12.5	2596	2522	-2.9	42.5	42.3	-0.5
54	0.08	0.08	0.0	2572	2545	-1.0	43.3	43.3	0.0
55	0.09	0.09	0.0	2596	2515	-3.1	42.1	42.1	0.0
56	0.09	0.09	0.0	2599	2653	2.1	44.0	43.8	-0.5
X-Bar	0.083	0.086	-	2580.1	2562.6	-	42.6	42.6	-
$\sigma$	0.005	0.005	-	47.103	36.546	-	0.499	0.427	-

QE File No.	Time-out for function test or	Issued Date	Reported By	Approved By
DG03FNL082	2694.00	2004/8/6 10:00 PM	Huiling.Fu	Even.Liu