



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 AFB 60x60x25.4 mm series as the right table	AFB0648EH	AFB0648SH	AFB0648VH	AFB0648HH	

Representative Test P/N : AFB0648EH-ABF00

Instruments used: 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D On/Off Cycles: Every 500 hours

◎ **L₁₀ Expectancy:** **70,000** hours minimum @ fan rated voltage and the temperature of 40°C

According to the equation for **Weibull distribution**, $MTTF \doteq 7 \times L_{10} = 490,000$ 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_{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%), and

Stress/Elevated Temperature T _s (°C)	Unstress Temperature T _u (°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 (hours)	Verified L ₁₀ (hours)
70	40	8.00	56	2.303	3,478	8,478.0	1,194,503	170,643

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2004/6/4 4:00 PM	2005/6/28 7:46 AM	<input type="checkbox"/> In process	<input checked="" type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination	8478.0

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.**)

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 (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	22.63	3,378,565	482,652
30	16.00	2,389,006	341,287
40	8.00	1,194,503	170,643
50	4.00	597,252	85,322
60	2.00	298,626	42,661
70	1.00	149,313	21,330

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
TH04FNL050	5850.00	2006/1/22 4:00 PM	Ch.Sirirote	Luc



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)
3,478	2004/6/4 4:00 PM	2005/6/28 7:46 AM	56	0	8478.0

Representative Test P/N : AFB0648EH-ABF00	Current Test Status	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	In process	In process	(exceed requested)	Termination

Instruments used: 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample P/N : **AFB0648EH-ABF00**

Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)
	Current Spec. (A) 0.17 Max.	Current Spec. (A) 0.17 Max.		Speed Spec. (RPM) 6800 Ref.	Speed Spec. (RPM) 6800-15%		Noise Spec. (dB A) 50.5 Max.	Noise Spec. (dB A) 53.5 Max.	
1	0.13	0.13	0.0	6853	6700	-2.2	49.9	48.5	-2.8
2	0.11	0.11	0.0	6471	6656	2.9	47.3	48.0	1.5
3	0.11	0.11	0.0	6595	6529	-1.0	47.4	47.3	-0.2
4	0.11	0.11	0.0	6545	6540	-0.1	47.0	47.5	1.1
5	0.12	0.12	0.0	6826	6631	-2.9	49.4	49.6	0.4
6	0.11	0.12	9.1	6602	6581	-0.3	48.0	48.6	1.3
7	0.13	0.13	0.0	6834	6743	-1.3	49.8	48.3	-3.0
8	0.13	0.12	-7.7	6847	6780	-1.0	49.5	48.7	-1.6
9	0.12	0.12	0.0	6706	6739	0.5	49.2	48.0	-2.4
10	0.13	0.13	0.0	6875	6560	-4.6	49.6	48.2	-2.8
11	0.12	0.12	0.0	6808	6598	-3.1	48.8	48.5	-0.6
12	0.11	0.12	9.1	6567	6568	0.0	47.9	47.3	-1.3
13	0.12	0.11	-8.3	6600	6623	0.3	48.2	48.6	0.8
14	0.12	0.11	-8.3	6546	6698	2.3	47.6	48.7	2.3
15	0.11	0.11	0.0	6542	6680	2.1	47.7	47.5	-0.4
16	0.12	0.12	0.0	6651	6673	0.3	48.4	49.1	1.4
17	0.12	0.11	-8.3	6624	6589	-0.5	47.8	47.6	-0.4
18	0.12	0.12	0.0	6649	6599	-0.8	48.0	47.9	-0.2
19	0.11	0.11	0.0	6594	6641	0.7	47.6	48.6	2.1
20	0.12	0.12	0.0	6651	6590	-0.9	47.9	47.5	-0.8
21	0.11	0.12	9.1	6530	6530	0.0	47.0	48.0	2.1
22	0.12	0.11	-8.3	6643	6589	-0.8	48.4	48.5	0.2
23	0.12	0.12	0.0	6676	6646	-0.4	49.2	47.5	-3.5
24	0.12	0.12	0.0	6626	6550	-1.1	48.6	48.6	0.0
25	0.11	0.12	9.1	6571	6520	-0.8	48.7	48.2	-1.0
26	0.11	0.11	0.0	6555	6549	-0.1	47.8	47.7	-0.2
27	0.11	0.12	9.1	6574	6596	0.3	49.0	49.5	1.0
28	0.12	0.12	0.0	6646	6589	-0.9	49.5	48.7	-1.6
29	0.12	0.11	-8.3	6616	6560	-0.8	48.5	47.9	-1.2
30	0.12	0.12	0.0	6653	6590	-0.9	49.2	47.7	-3.0
31	0.11	0.11	0.0	6528	6500	-0.4	48.3	47.5	-1.7
32	0.12	0.11	-8.3	6643	6586	-0.9	49.0	48.0	-2.0
33	0.12	0.12	0.0	6605	6546	-0.9	48.8	48.5	-0.6
34	0.12	0.12	0.0	6616	6614	0.0	49.0	48.3	-1.4
35	0.12	0.12	0.0	6628	6610	-0.3	48.3	48.1	-0.4



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36	0.12	0.11	-8.3	6649	6570	-1.2	48.2	47.7	-1.0
37	0.11	0.12	9.1	6595	6521	-1.1	48.9	47.1	-3.7
38	0.11	0.11	0.0	6574	6529	-0.7	48.0	48.6	1.3
39	0.12	0.11	-8.3	6618	6613	-0.1	48.7	48.0	-1.4
40	0.12	0.11	-8.3	6633	6590	-0.6	49.0	48.1	-1.8
41	0.12	0.12	0.0	6607	6690	1.3	48.8	47.5	-2.7
42	0.12	0.12	0.0	6658	6640	-0.3	49.5	48.2	-2.6
43	0.12	0.12	0.0	6686	6695	0.1	48.9	49.8	1.8
44	0.12	0.11	-8.3	6657	6540	-1.8	48.6	47.7	-1.9
45	0.12	0.12	0.0	6614	6630	0.2	48.3	47.9	-0.8
46	0.11	0.11	0.0	6665	6580	-1.3	48.7	47.9	-1.6
47	0.11	0.11	0.0	6589	6579	-0.2	48.4	48.2	-0.4
48	0.11	0.12	9.1	6575	6539	-0.5	48.0	48.0	0.0
49	0.12	0.11	-8.3	6645	6566	-1.2	48.7	47.4	-2.7
50	0.11	0.12	9.1	6642	6540	-1.5	47.5	48.6	2.3
51	0.11	0.11	0.0	6560	6701	2.1	49.5	47.4	-4.2
52	0.12	0.11	-8.3	6854	6531	-4.7	47.4	47.5	0.2
53	0.12	0.11	-8.3	6572	6568	-0.1	47.8	48.0	0.4
54	0.11	0.11	0.0	6556	6592	0.5	48.7	48.6	-0.2
55	0.12	0.12	0.0	6607	9579	45.0	48.9	47.9	-2.0
56	0.12	0.11	-8.3	6579	6580	0.0	47.7	47.8	0.2
X-Bar	0.12	0.12	-	6636.27	6654.75	-	48.47	48.12	-
σ	0.01	0.01	-	167.74	721.69	-	1.39	1.16	-

QE File No.	Time-out for function test or others (hrs)	Issued Date	Reported By	Approved By
TH04FNL050	5850.00	2006/1/22 4:00 PM	Ch.Sirirote	Luc