



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 AFB40x40x10.0 mm series as the right table	AFB0412MA-A	AFB0412VHA-AP06	AFB0412VHA-AX01	AFB0412HHA-TA5F	AFB0412VHA-AW87
	AFB0412MA-9Q65	AFB0412LA-A	AFB0412HHA-A	AFB0412HHA-A	AFB0412VHA-AWFW
	AFB0412VHA-AR00	AFB0412VHA-BW31	AFB0412VHA-DU48	AFB0412VHA-AG6N	AFB0412HHA-AFZT
	AFB0412HA-A	AFB0412MA-DU09	AFB0412VHA-AF00	AFB0412VHA-BH45	AFB0412VA-00

Representative Test P/N : AFB0412VHA-A

Equipment: 1.Oven: E24-F0055

☉ **L₁₀ Expectancy: 70,000 hours minimum @ fan rated voltage and the temperature of 40°C**
 According to the equation for **Weibull distribution**, **MTTF ≐ 7×L10 = 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,

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

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	3,478	4,478.0	630,925	90,132

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2007/5/22 11:00 AM	2007/12/11 1:16 AM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	4478.0

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.)

Temperature for MTTF Estimation (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	22.63	1,784,526	254,932
30	16.00	1,261,851	180,264
40	8.00	630,925	90,132
50	4.00	315,463	45,066
60	2.00	157,731	22,533
70	1.00	78,866	11,267

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	<input checked="" type="checkbox"/> Accept
	<input type="checkbox"/> Reject

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG07FNL100	3157.50	2008/5/11	Nan Yang	Zenny Lei



DC FAN FUNCTION TEST RECORD

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	AFB0412HA-A	AFB0412MA-DU09	AFB0412VHA-AF00	AFB0412VHA-BH45	AFB0412VA-00

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2007/5/22 11:00 AM	2007/12/11 1:16 AM	56	0	4478.0

Representative Test P/N : AFB0412VHA-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-F0055

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.	Current Spec.		Speed Spec.	Speed Spec.		Noise Spec.	Noise Spec.	
	(mA) 120 Max.	(mA) 120 Max.		(RPM) 7200-8800	(RPM) 7200-8800		(dB A) 40.0Max	(dB A) 40.0Max	
1	63	55	-12.7	7346	8338	13.5	31.1	32.7	1.6
2	65	51	-21.5	7473	8485	13.5	31.8	33.9	2.1
3	64	54	-15.6	7448	8373	12.4	33.7	33.1	-0.6
4	79	52	-34.2	7377	8456	14.6	31.3	33.5	2.2
5	63	57	-9.5	7457	8126	9.0	32.5	33.8	1.3
6	80	54	-32.5	7317	8455	15.6	31.6	33.5	1.9
7	79	53	-32.9	7346	8424	14.7	32.7	33.8	1.1
8	64	50	-21.9	7386	8343	13.0	33.5	32.9	-0.6
9	62	58	-6.5	7666	8626	12.5	31.3	33.3	2.0
10	78	56	-28.2	7405	8265	11.6	32.2	33.5	1.3
11	83	53	-36.1	7792	8353	7.2	31.6	32.8	1.2
12	77	51	-33.8	7601	8317	9.4	31.3	33.1	1.8
13	61	53	-13.1	7740	8393	8.4	33.1	33.7	0.6
14	79	52	-34.2	7382	8392	13.7	31.5	33.5	2.0
15	78	59	-24.4	7515	8789	17.0	32.9	33.2	0.3
16	77	56	-27.3	7498	8225	9.7	31.7	33.0	1.3
17	63	53	-15.9	7428	8353	12.5	32.8	33.9	1.1
18	69	56	-18.8	8052	8108	0.7	31.9	33.5	1.6
19	62	51	-17.7	7470	8361	11.9	32.1	33.7	1.6
20	77	62	-19.5	7749	8548	10.3	32.3	33.1	0.8
21	77	53	-31.2	7372	8288	12.4	30.6	33.2	2.6
22	63	56	-11.1	7418	8551	15.3	31.8	33.8	2.0
23	85	55	-35.3	7630	8312	8.9	29.9	32.1	2.2
24	79	61	-22.8	7205	8568	18.9	31.8	33.7	1.9
25	85	55	-35.3	7653	8333	8.9	31.7	33.5	1.8
26	79	56	-29.1	7505	8312	10.8	32.0	33.1	1.1
27	62	55	-11.3	7372	8570	16.3	32.5	33.4	0.9
28	81	57	-29.6	7321	8417	15.0	31.7	33.3	1.6
29	76	53	-30.3	7608	8360	9.9	31.6	33.7	2.1
30	65	51	-21.5	8126	8545	5.2	31.7	33.4	1.7
31	80	60	-25.0	7387	8526	15.4	31.5	33.2	1.7
32	65	62	-4.6	7450	8456	13.5	32.0	33.5	1.5
33	65	63	-3.1	7793	8358	7.3	31.8	33.2	1.4
34	65	61	-6.2	7587	7925	4.5	32.0	33.1	1.1
35	63	64	1.6	7350	8212	11.7	31.4	33.5	2.1

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG07FNL100	3157.50	2008/5/11	Nan Yang	Zenny Lei



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Representative Test P/N : AFB0412VHA-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-F0055

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.	Current Spec.		Speed Spec.	Speed Spec.		Noise Spec.	Noise Spec.	
	(mA) 120 Max.	(mA) 120 Max.		(RPM) 7200-8800	(RPM) 7200-8800		(dB A) 40.0Max	(dB A) 40.0Max	
36	62	57	-8.1	7733	8321	7.6	31.8	32.8	1.0
37	78	56	-28.2	7516	8409	11.9	31.5	33.4	1.9
38	65	51	-21.5	7496	8566	14.3	31.7	33.8	2.1
39	81	54	-33.3	7364	8098	10.0	31.6	33.1	1.5
40	80	54	-32.5	7370	8465	14.9	31.9	33.5	1.6
41	79	52	-34.2	7491	8486	13.3	31.5	33.8	2.3
42	62	54	-12.9	7758	8528	9.9	32.3	33.2	0.9
43	78	53	-32.1	7570	8328	10.0	31.7	33.4	1.7
44	80	57	-28.8	7437	8409	13.1	31.4	33.9	2.5
45	80	57	-28.8	7419	8410	13.4	30.7	33.5	2.8
46	63	54	-14.3	7852	8368	6.6	32.0	33.8	1.8
47	64	53	-17.2	7347	8485	15.5	31.6	33.1	1.5
48	62	53	-14.5	7667	8364	9.1	32.5	33.4	0.9
49	80	52	-35.0	7389	8235	11.4	30.7	33.5	2.8
50	80	54	-32.5	7412	8229	11.0	31.8	33.5	1.7
51	80	54	-32.5	7415	8366	12.8	32.5	33.8	1.3
52	77	55	-28.6	7696	8318	8.1	31.7	33.1	1.4
53	59	56	-5.1	8026	8425	5.0	31.9	33.7	1.8
54	78	60	-23.1	7407	8365	12.9	32.0	33.4	1.4
55	77	63	-18.2	7451	8456	13.5	32.2	33.1	0.9
56	63	68	7.9	7422	8356	12.6	31.4	33.7	2.3
X-Bar	72.2	55.6	-	7526.1	8383.0	-	31.84	33.39	-
σ	8.228	3.845	-	195.079	141.965	-	0.661	0.353	-

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DG07FNL100	3157.50	2008/5/11	Nan Yang	Zenny Lei