DELTA ELECTRONICS, INC.

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 **AFC80x80x20mm** series as the right table	AFB0812HHD-A	AFB0812LD-A			
	AFB0812HD-A	AFB0812MD-SE24			
	AFB0812MD-A	AFB0812HD-SE28			
	AFB0812VHD-A				
Representative Test P/N :AFB0812VHD-AF00					
Equipment: 1.Oven: E24-F0052			On/Off Cycles: Every 500 hours		

◎ **L_{10} Expectancy: 70,000 hours minimum @ fan rated voltage and the temperature of 40℃**

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,

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

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 (℃) (Actual Test Temperature)	Unstress Temperature Tu (℃)	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 ℃ (hours)	Verified L_{10} 40 ℃ (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)
2004/5/31 7:00 PM	2005/5/5 4:03 PM	☐ In process	☐ In process (exceed requested)	☑ 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_{10} 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 (℃)	Acceleration Factor A_F	Estimated MTTF (hours)	Estimated L_{10} (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 descrease 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 others (hours)	Issued Date	Reported By	Approved By
DG04FNL154	**1177.50**	**2005/5/5 4:30 PM**	**Guie.Lin**	**Gx.Xu**

Note: The test sample equivalent to STD , Part number: AFB0812VHD-AF00

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DC FAN FUNCTION TEST RECORD
FOR LIFE EXPERIMENT

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AFB0812HHD-A	AFB0812LD-A			
AFB0812HD-A	AFB0812MD-SE24			
AFB0812MD-A	AFB0812HD-SE28			
AFB0812VHD-A				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
6,956	2004/5/31 7:00 PM	2005/5/5 4:03 PM	56	0	**6956.0**

Representative Test P/N :AFB0812VHD-AF00	Current Test Status	☐ In process	☐ In process (exceed requested)	☑ Termination

Equipment: 1.Oven: E24-F0052 — On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) **0.38Max.**	Final Test Current Spec. (A) **0.38Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **4416-5184**	Final Test Speed Spec. (RPM) **4416-5184**	Deviation (%)	Initial Test Noise Spec. (dB A) **52.0Max**	Final Test Noise Spec. (dB A) **52.0Max**	Deviation (%)
1	0.27	0.28	3.7	4872	4829	-0.9	45.0	46.3	2.9
2	0.28	0.28	0.0	4853	4832	-0.4	45.3	46.5	2.6
3	0.28	0.29	3.6	4875	4853	-0.5	44.8	46.8	4.5
4	0.28	0.28	0.0	4848	4861	0.3	45.5	46.4	2.0
5	0.27	0.27	0.0	4820	4739	-1.7	45.7	46.2	1.1
6	0.27	0.27	0.0	4878	4840	-0.8	44.8	45.3	1.1
7	0.30	0.29	-3.3	4892	4903	0.2	45.2	45.9	1.5
8	0.28	0.28	0.0	4890	4932	0.9	45.4	46.1	1.5
9	0.26	0.26	0.0	4801	4815	0.3	45.9	46.7	1.7
10	0.27	0.27	0.0	4847	4885	0.8	44.8	46.4	3.6
11	0.30	0.30	0.0	4907	4910	0.1	44.3	46.2	4.3
12	0.27	0.27	0.0	4837	4830	-0.1	44.6	45.7	2.5
13	0.28	0.29	3.6	4824	4864	0.8	45.3	45.9	1.3
14	0.29	0.29	0.0	4858	4906	1.0	44.6	46.2	3.6
15	0.28	0.27	-3.6	4841	4839	0.0	45.3	46.5	2.6
16	0.29	0.29	0.0	4885	4849	-0.7	44.8	46.7	4.2
17	0.28	0.28	0.0	4827	4808	-0.4	45.3	46.9	3.5
18	0.27	0.27	0.0	4835	4793	-0.9	45.7	45.9	0.4
19	0.28	0.27	-3.6	4855	4833	-0.5	44.8	45.5	1.6
20	0.29	0.29	0.0	4901	4887	-0.3	44.7	45.7	2.2
21	0.28	0.29	3.6	4760	4857	2.0	45.5	45.3	-0.4
22	0.28	0.29	3.6	4911	4793	-2.4	44.4	45.6	2.8
23	0.27	0.28	3.7	4865	4831	-0.7	44.9	46.8	4.2
24	0.28	0.28	0.0	4853	4814	-0.8	45.3	46.2	2.0
25	0.28	0.29	3.6	4842	4843	0.0	45.9	46.7	1.7
26	0.29	0.29	0.0	4880	4897	0.3	44.7	46.3	3.6
27	0.28	0.28	0.0	4868	4856	-0.2	45.2	46.6	3.1
28	0.28	0.28	0.0	4858	4800	-1.2	44.7	45.9	2.7
29	0.28	0.28	0.0	4929	4841	-1.8	45.3	46.2	2.0
30	0.28	0.27	-3.6	4815	4923	2.2	44.9	45.9	2.2
31	0.30	0.31	3.3	4852	4886	0.7	45.1	45.3	0.4
32	0.29	0.29	0.0	4886	4841	-0.9	45.4	46.5	2.4
33	0.27	0.28	3.7	4796	4844	1.0	45.7	46.2	1.1
34	0.29	0.28	-3.4	4897	4872	-0.5	44.8	46.6	4.0
35	0.27	0.27	0.0	4834	4796	-0.8	45.3	45.9	1.3

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG04FNL154	**1177.50**	**2005/5/5 4:30 PM**	**Guie.Lin**	**Gx.Xu**

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DC FAN FUNCTION TEST RECORD

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	AFB0812HD-A	AFB0812MD-SE24			
	AFB0812MD-A	AFB0812HD-SE28			
	AFB0812VHD-A				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
6,956	2004/5/31 7:00 PM	2005/5/5 4:03 PM	56	0	**6956.0**

Representative Test P/N :AFB0812VHD-AF00	**Current Test Status**	☐ In process	☐ In process (exceed requested)	☑ Termination
Equipment: 1.Oven: E24-F0052		On/Off Cycles: Every 500 hours		

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) **0.38Max.**	Final Test Current Spec. (A) **0.38Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **4416-5184**	Final Test Speed Spec. (RPM) **4416-5184**	Deviation (%)	Initial Test Noise Spec. (dB A) **52.0Max**	Final Test Noise Spec. (dB A) **52.0Max**	Deviation (%)
36	0.28	0.28	0.0	4895	4876	-0.4	45.6	46.1	1.1
37	0.28	0.28	0.0	4860	4921	1.3	45.4	45.9	1.1
38	0.29	0.29	0.0	4846	4875	0.6	44.8	46.4	3.6
39	0.27	0.27	0.0	4850	4783	-1.4	45.2	46.7	3.3
40	0.30	0.30	0.0	4892	4830	-1.3	45.9	46.5	1.3
41	0.29	0.30	3.4	4911	4878	-0.7	45.3	46.4	2.4
42	0.29	0.29	0.0	4880	4881	0.0	44.8	46.2	3.1
43	0.28	0.28	0.0	4910	4876	-0.7	45.1	46.4	2.9
44	0.29	0.29	0.0	4886	4895	0.2	45.7	46.7	2.2
45	0.29	0.29	0.0	4805	4835	0.6	44.8	45.2	0.9
46	0.28	0.28	0.0	4930	4897	-0.7	45.2	45.4	0.4
47	0.29	0.29	0.0	4926	4912	-0.3	45.6	45.9	0.7
48	0.27	0.27	0.0	4870	4806	-1.3	45.3	46.3	2.2
49	0.28	0.27	-3.6	4812	4902	1.9	45.7	46.7	2.2
50	0.28	0.29	3.6	4889	4854	-0.7	44.8	45.3	1.1
51	0.28	0.28	0.0	4820	4828	0.2	45.1	45.9	1.8
52	0.28	0.28	0.0	4818	4828	0.2	45.3	45.7	0.9
53	0.28	0.29	3.6	4889	4811	-1.6	45.7	46.2	1.1
54	0.28	0.29	3.6	4869	4878	0.2	45.9	46.7	1.7
55	0.29	0.28	-3.4	4853	4866	0.3	45.3	46.6	2.9
56	0.29	0.29	0.0	4876	4845	-0.6	44.9	46.3	3.1
X-Bar	0.282	0.283	-	4862.1	4853.2	-	45.18	46.17	-
σ	0.009	0.010	-	36.238	40.224	-	0.407	0.453	-

QE File No.	Time-out for function test or others (hrs)	Issued Date	Reported By	Approved By
DG04FNL154	**1177.50**	**2005/5/5 4:30 PM**	**Guie.Lin**	**Gx.Xu**