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 **AFB80x80x25.4 mm** series as the right table	AFB0812SH-TP12				
Representative Test P/N :AFB0812SH-SP05					
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/ElevatedTemperature 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)
2004/4/9 5:30 PM	2005/4/6 3:33 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 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 others (hours)	Issued Date	Reported By	Approved By
DG04FNL080	**1730.50**	**2005/4/6 4:00 PM**	**Guie.Lin**	**Gx.Xu**

Note: The test sample equivalent to STD , Part umber: 200005630.

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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)
6,956	2004/4/9 5:30 PM	2005/4/6 3:33 PM	56	0	**6956.0**

Representative Test P/N :AFB0812SH-SP05	**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) **0.35Max.**	Final Test Current Spec. (A) **0.35Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **4140-4868**	Final Test Speed Spec. (RPM) **4140-4868**	Deviation (%)	Initial Test Noise Spec. (dB A) **50.0Max**	Final Test Noise Spec. (dB A) **50.0Max**	Deviation (%)
1	0.26	0.26	0.0	4429	4474	1.0	43.3	42.6	-1.6
2	0.27	0.27	0.0	4591	4545	-1.0	43.4	43.3	-0.2
3	0.27	0.27	0.0	4542	4533	-0.2	43.1	43.6	1.2
4	0.26	0.26	0.0	4537	4554	0.4	43.0	43.5	1.2
5	0.27	0.27	0.0	4536	4490	-1.0	43.0	43.0	0.0
6	0.27	0.27	0.0	4547	4550	0.1	44.1	43.6	-1.1
7	0.27	0.28	3.7	4535	4454	-1.8	43.8	43.1	-1.6
8	0.27	0.27	0.0	4590	4551	-0.8	43.2	43.3	0.2
9	0.27	0.27	0.0	4587	4499	-1.9	43.6	43.5	-0.2
10	0.26	0.26	0.0	4525	4522	-0.1	43.4	43.1	-0.7
11	0.26	0.26	0.0	4600	4597	-0.1	44.0	42.9	-2.5
12	0.27	0.27	0.0	4587	4558	-0.6	43.7	43.3	-0.9
13	0.27	0.26	-3.7	4478	4593	2.6	43.2	43.7	1.2
14	0.26	0.26	0.0	4533	4533	0.0	43.1	43.5	0.9
15	0.27	0.27	0.0	4498	4492	-0.1	43.5	43.1	-0.9
16	0.26	0.26	0.0	4580	4511	-1.5	43.4	43.6	0.5
17	0.27	0.27	0.0	4548	4517	-0.7	43.3	43.2	-0.2
18	0.26	0.26	0.0	4542	4490	-1.1	43.2	43.7	1.2
19	0.26	0.26	0.0	4515	4468	-1.0	43.1	42.9	-0.5
20	0.26	0.26	0.0	4584	4529	-1.2	43.6	43.1	-1.1
21	0.27	0.27	0.0	4501	4490	-0.2	43.4	43.5	0.2
22	0.26	0.26	0.0	4514	4514	0.0	43.1	43.9	1.9
23	0.27	0.27	0.0	4552	4551	0.0	43.4	43.6	0.5
24	0.27	0.27	0.0	4551	4492	-1.3	43.5	42.9	-1.4
25	0.26	0.27	3.8	4514	4500	-0.3	43.3	43.6	0.7
26	0.26	0.26	0.0	4499	4590	2.0	43.2	43.3	0.2
27	0.27	0.27	0.0	4555	4495	-1.3	43.2	43.1	-0.2
28	0.26	0.26	0.0	4567	4517	-1.1	43.4	43.7	0.7
29	0.26	0.26	0.0	4507	4545	0.8	43.1	43.5	0.9
30	0.26	0.26	0.0	4479	4652	3.9	43.3	42.9	-0.9
31	0.26	0.26	0.0	4458	4590	3.0	43.2	43.7	1.2
32	0.26	0.27	3.8	4640	4499	-3.0	43.4	43.9	1.2
33	0.26	0.26	0.0	4557	4567	0.2	43.6	42.5	-2.5
34	0.27	0.27	0.0	4534	4539	0.1	43.4	42.7	-1.6
35	0.26	0.27	3.8	4562	4545	-0.4	43.2	43.3	0.2

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG04FNL080	**1730.50**	**2005/4/6 4:00 PM**	**Guie.Lin**	**Gx.Xu**

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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)
6,956	2004/4/9 5:30 PM	2005/4/6 3:33 PM	56	0	**6956.0**

Representative Test P/N :AFB0812SH-SP05	**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) **0.35Max.**	Final Test Current Spec. (A) **0.35Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **4140-4868**	Final Test Speed Spec. (RPM) **4140-4868**	Deviation (%)	Initial Test Noise Spec. (dB A) **50.0Max**	Final Test Noise Spec. (dB A) **50.0Max**	Deviation (%)
36	0.28	0.28	0.0	4549	4574	0.5	43.1	43.5	0.9
37	0.26	0.26	0.0	4558	4582	0.5	43.5	42.9	-1.4
38	0.26	0.27	3.8	4514	4596	1.8	43.3	43.1	-0.5
39	0.26	0.27	3.8	4519	4577	1.3	43.2	43.6	0.9
40	0.26	0.26	0.0	4584	4599	0.3	43.0	43.3	0.7
41	0.26	0.26	0.0	4550	4552	0.0	43.1	42.5	-1.4
42	0.27	0.27	0.0	4558	4499	-1.3	43.5	42.9	-1.4
43	0.28	0.28	0.0	4536	4592	1.2	43.3	43.1	-0.5
44	0.25	0.27	8.0	4500	4545	1.0	43.7	43.3	-0.9
45	0.27	0.27	0.0	4530	4590	1.3	43.8	42.8	-2.3
46	0.26	0.26	0.0	4518	4572	1.2	43.0	43.5	1.2
47	0.28	0.28	0.0	4585	4491	-2.1	43.1	43.3	0.5
48	0.27	0.27	0.0	4567	4577	0.2	43.6	43.7	0.2
49	0.26	0.26	0.0	4571	4594	0.5	43.3	42.9	-0.9
50	0.29	0.26	-10.3	4473	4492	0.4	43.5	42.8	-1.6
51	0.27	0.28	3.7	4661	4511	-3.2	43.1	43.5	0.9
52	0.26	0.27	3.8	4558	4527	-0.7	43.3	43.1	-0.5
53	0.27	0.27	0.0	4490	4500	0.2	43.2	43.3	0.2
54	0.25	0.27	8.0	4436	4493	1.3	43.6	43.5	-0.2
55	0.26	0.26	0.0	4508	4587	1.8	43.6	43.7	0.2
56	0.25	0.26	4.0	4508	4527	0.4	43.3	43.1	-0.5
X-Bar	0.265	0.266	-	4537.8	4536.4	-	43.36	43.27	-
σ	0.007	0.006	-	45.081	42.555	-	0.251	0.352	-

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DG04FNL080	**1730.50**	**2005/4/6 4:00 PM**	**Guie.Lin**	**Gx.Xu**