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 **AFB80x80x25.4mm** series as the right table	**AFB0848HH**				
	AFB0848H				
	AFB0848M				
	AFB0848L				
Representative Test P/N :AFB0848HH					
Equipment: 1.Oven: E24-F0057			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%), and

Stress/Elevated Temperature Ts (℃)	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)
70	**40**	**8.00**	**56**	**2.303**	**3,478**	**3,478.0**	**490,031**	**70,004**

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2004/7/31 10:00 PM	2005/1/7 5:16 PM	☐ In process	☐ In process (exceed requested)	☑ Termination	**3478.0**

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	**22.63**	**1,386,017**	**198,002**
30	**16.00**	**980,062**	**140,009**
40	**8.00**	**490,031**	**70,004**
50	**4.00**	**245,015**	**35,002**
60	**2.00**	**122,508**	**17,501**
70	**1.00**	**61,254**	**8,751**

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
DG04FNL205	**357.50**	**2005/1/7 5:30 PM**	**Huiling.Fu**	**Even.liu**

Note: The test sample equivalent to STD , Part number: AFB0848HH .

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DC FAN FUNCTION TEST RECORD
FOR LIFE EXPERIMENT

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	AFB0848H				
	AFB0848M				
	AFB0848L				

Required Test Time (hrs)	**Date for Test Beginning**	**Date for Test Termination**	**Sample Size (pcs):**	**Failure (pcs):**	**Current Total Test Time (hrs)**
3,478	2004/7/31 10:00 PM	2005/1/7 5:16 PM	56	0	**3478.0**

Representative Test P/N :AFB0848HH	**Current Test Status**	☐ In process	☐ In process (exceed requested)	☑ Termination
Equipment: 1.Oven: E24-F0057		On/Off Cycles: Every 500 hours		

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) **0.12Max.**	Final Test Current Spec. (A) **0.12Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **2990-3510**	Final Test Speed Spec. (RPM) **2990-3510**	Deviation (%)	Initial Test Noise Spec. (dB A) **37.0Max**	Final Test Noise Spec. (dB A) **37.0Max**	Deviation (%)
1	0.05	0.05	0.0	3206	3312	3.3	34.5	34.0	-1.4
2	0.05	0.05	0.0	3249	3256	0.2	34.9	34.6	-0.9
3	0.05	0.05	0.0	3169	3205	1.1	34.2	34.4	0.6
4	0.05	0.05	0.0	3201	3258	1.8	35.0	35.0	0.0
5	0.05	0.05	0.0	3276	3156	-3.7	34.3	34.6	0.9
6	0.05	0.05	0.0	3221	3183	-1.2	34.7	33.8	-2.6
7	0.05	0.05	0.0	3250	3384	4.1	34.7	34.8	0.3
8	0.05	0.05	0.0	3203	3195	-0.2	35.3	34.2	-3.1
9	0.05	0.05	0.0	3240	3265	0.8	34.1	34.7	1.8
10	0.05	0.05	0.0	3242	3200	-1.3	34.6	34.2	-1.2
11	0.05	0.05	0.0	3270	3209	-1.9	34.0	34.0	0.0
12	0.05	0.05	0.0	3216	3216	0.0	35.2	35.1	-0.3
13	0.05	0.05	0.0	3269	3255	-0.4	34.7	34.3	-1.2
14	0.05	0.05	0.0	3236	3191	-1.4	34.3	34.3	0.0
15	0.05	0.05	0.0	3225	3173	-1.6	34.7	34.9	0.6
16	0.05	0.05	0.0	3236	3248	0.4	34.9	34.7	-0.6
17	0.05	0.05	0.0	3258	3239	-0.6	34.5	34.7	0.6
18	0.05	0.05	0.0	3283	3240	-1.3	34.5	34.7	0.6
19	0.05	0.05	0.0	3215	3243	0.9	34.8	34.1	-2.0
20	0.05	0.05	0.0	3281	3149	-4.0	34.6	35.4	2.3
21	0.05	0.05	0.0	3279	3249	-0.9	35.0	35.3	0.9
22	0.05	0.05	0.0	3279	3190	-2.7	34.6	35.0	1.2
23	0.05	0.05	0.0	3284	3306	0.7	34.2	34.6	1.2
24	0.05	0.05	0.0	3249	3293	1.4	35.3	35.2	-0.3
25	0.05	0.05	0.0	3208	3265	1.8	34.4	34.6	0.6
26	0.05	0.05	0.0	3309	3321	0.4	35.0	34.1	-2.6
27	0.05	0.05	0.0	3221	3240	0.6	34.6	34.7	0.3
28	0.05	0.05	0.0	3233	3178	-1.7	34.9	34.2	-2.0
29	0.05	0.05	0.0	3278	3218	-1.8	34.6	34.7	0.3
30	0.05	0.05	0.0	3207	3253	1.4	35.1	33.9	-3.4
31	0.05	0.05	0.0	3266	3166	-3.1	34.8	34.8	0.0
32	0.05	0.05	0.0	3257	3129	-3.9	35.2	34.5	-2.0
33	0.05	0.05	0.0	3382	3301	-2.4	34.7	34.9	0.6
34	0.05	0.05	0.0	3238	3242	0.1	35.0	34.6	-1.1
35	0.05	0.05	0.0	3288	3271	-0.5	35.1	33.8	-3.7

QE File No.	**Time-out for function test or others (hours)**	**Issued Date**	**Reported By**	**Approved By**
DG04FNL205	**357.50**	**2005/1/7 5:30 PM**	**Huiling.Fu**	**Even.Liu**

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DC FAN FUNCTION TEST RECORD

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	AFB0848H			
	AFB0848M			
	AFB0848L			

Required Test Time (hrs)	**Date for Test Beginning**	**Date for Test Termination**	**Sample Size (pcs):**	**Failure (pcs):**	**Current Total Test Time (hrs)**
3,478	2004/7/31 10:00 PM	2005/1/7 5:16 PM	56	0	**3478.0**

Representative Test P/N :AFB0848HH	**Current Test Status**	☐ In process	☐ In process (exceed requested)	☑ Termination
Equipment: 1.Oven: E24-F0057		On/Off Cycles: Every 500 hours		

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) **0.12Max.**	Final Test Current Spec. (A) **0.12Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **2990-3510**	Final Test Speed Spec. (RPM) **2990-3510**	Deviation (%)	Initial Test Noise Spec. (dB A) **37.0Max**	Final Test Noise Spec. (dB A) **37.0Max**	Deviation (%)
36	0.05	0.05	0.0	3238	3241	0.1	34.6	34.2	-1.2
37	0.05	0.05	0.0	3242	3286	1.4	35.4	34.8	-1.7
38	0.05	0.05	0.0	3237	3271	1.1	34.9	34.4	-1.4
39	0.05	0.05	0.0	3309	3209	-3.0	34.7	34.4	-0.9
40	0.05	0.05	0.0	3294	3315	0.6	34.3	35.2	2.6
41	0.05	0.05	0.0	3223	3214	-0.3	35.0	33.6	-4.0
42	0.05	0.05	0.0	3302	3255	-1.4	34.2	34.2	0.0
43	0.05	0.05	0.0	3234	3255	0.6	35.1	34.8	-0.9
44	0.05	0.05	0.0	3281	3337	1.7	34.4	34.6	0.6
45	0.05	0.05	0.0	3278	3223	-1.7	34.9	34.6	-0.9
46	0.05	0.05	0.0	3298	3222	-2.3	34.1	35.1	2.9
47	0.05	0.05	0.0	3227	3200	-0.8	35.2	34.2	-2.8
48	0.05	0.05	0.0	3312	3278	-1.0	34.9	34.7	-0.6
49	0.05	0.05	0.0	3373	3324	-1.5	35.1	34.4	-2.0
50	0.05	0.05	0.0	3242	3206	-1.1	34.4	34.9	1.5
51	0.05	0.05	0.0	3204	3235	1.0	34.8	34.5	-0.9
52	0.05	0.05	0.0	3251	3299	1.5	35.0	34.8	-0.6
53	0.05	0.05	0.0	3279	3301	0.7	34.8	34.1	-2.0
54	0.05	0.05	0.0	3237	3203	-1.1	35.2	34.4	-2.3
55	0.05	0.05	0.0	3273	3298	0.8	35.1	34.7	-1.1
56	0.05	0.05	0.0	3244	3251	0.2	34.5	34.2	-0.9
X-Bar	0.050	0.050	-	3255.4	3243.3	-	34.74	34.54	-
σ	0.000	0.000	-	39.861	51.656	-	0.348	0.399	-

QE File No.	**Time-out for function test or others (hrs)**	**Issued Date**	**Reported By**	**Approved By**
DG04FNL205	**357.50**	**2005/1/7 5:30 PM**	**Huiling.Fu**	**Even.liu**