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 **AFC60x60x15 mm** series as the right table					
Representative Test P/N :AFC0612DB-F00					
Equipment: 1.Oven: E24-F0057					

◎ **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)
2004/8/16 8:30 PM	2005/8/22 4:33 AM	☐ 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
DG04FNL220	1932.50	2005/8/22 5:00 AM	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	2004/8/16 8:30 PM	2005/8/22 4:33 AM	56	0	**6956.0**

Representative Test P/N :AFC0612DB-F00	**Current Test Status**	☐ In process	☐ In process (exceed requested)	☑ Termination
Equipment: 1.Oven: E24-F0057				

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) **0.37Max.**	Final Test Current Spec. (A) **0.37Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **6624-7776**	Final Test Speed Spec. (RPM) **6624-7776**	Deviation (%)	Initial Test Noise Spec. (dB A) **51.5Max**	Final Test Noise Spec. (dB A) **51.5Max**	Deviation (%)
1	0.30	0.29	-3.3	7378	7287	-1.2	47.6	47.3	-0.6
2	0.30	0.30	0.0	7423	7345	-1.1	47.3	47.5	0.4
3	0.30	0.31	3.3	7454	7358	-1.3	47.4	47.6	0.4
4	0.30	0.30	0.0	7302	7257	-0.6	47.5	47.5	0.0
5	0.30	0.29	-3.3	7380	7323	-0.8	47.4	47.7	0.6
6	0.29	0.29	0.0	7371	7395	0.3	47.6	47.3	-0.6
7	0.28	0.28	0.0	7322	7294	-0.4	47.8	47.3	-1.0
8	0.30	0.31	3.3	7330	7406	1.0	47.5	47.6	0.2
9	0.30	0.29	-3.3	7410	7270	-1.9	47.8	47.5	-0.6
10	0.30	0.30	0.0	7314	7316	0.0	47.6	47.4	-0.4
11	0.29	0.27	-6.9	7232	7345	1.6	47.8	47.3	-1.0
12	0.29	0.29	0.0	7336	7532	2.7	48.0	47.6	-0.8
13	0.29	0.28	-3.4	7293	7327	0.5	47.4	47.5	0.2
14	0.31	0.29	-6.5	7309	7209	-1.4	47.6	47.2	-0.8
15	0.30	0.30	0.0	7359	7395	0.5	47.8	47.3	-1.0
16	0.29	0.29	0.0	7280	7350	1.0	47.5	47.4	-0.2
17	0.29	0.27	-6.9	7274	7165	-1.5	47.6	47.7	0.2
18	0.29	0.30	3.4	7352	7236	-1.6	47.9	47.5	-0.8
19	0.30	0.30	0.0	7350	7393	0.6	48.0	47.6	-0.8
20	0.30	0.30	0.0	7312	7271	-0.6	48.2	47.4	-1.7
21	0.30	0.29	-3.3	7439	7376	-0.8	47.6	47.5	-0.2
22	0.30	0.30	0.0	7380	7488	1.5	47.5	47.6	0.2
23	0.30	0.29	-3.3	7411	7247	-2.2	48.3	47.3	-2.1
24	0.28	0.29	3.6	7458	7359	-1.3	47.6	47.5	-0.2
25	0.30	0.30	0.0	7385	7426	0.6	47.4	47.2	-0.4
26	0.29	0.30	3.4	7423	7393	-0.4	47.3	47.6	0.6
27	0.28	0.28	0.0	7349	7210	-1.9	47.6	47.4	-0.4
28	0.30	0.29	-3.3	7336	7345	0.1	47.6	47.5	-0.2
29	0.29	0.29	0.0	7295	7208	-1.2	47.7	47.3	-0.8
30	0.29	0.30	3.4	7247	7233	-0.2	47.5	47.5	0.0
31	0.30	0.30	0.0	7458	7287	-2.3	47.8	47.6	-0.4
32	0.30	0.30	0.0	7402	7344	-0.8	48.0	47.7	-0.6
33	0.30	0.30	0.0	7433	7314	-1.6	47.6	47.5	-0.2
34	0.31	0.31	0.0	7453	7450	0.0	47.5	47.4	-0.2
35	0.30	0.30	0.0	7235	7215	-0.3	47.3	47.5	0.4

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG04FNL220	**1932.50**	**2005/8/22 5:00 AM**	**Guie.Lin**	**Gx.Xu**

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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	2004/8/16 8:30 PM	2005/8/22 4:33 AM	56	0	**6956.0**

Representative Test P/N :AFC0612DB-F00	**Current Test Status**	☐ In process	☐ In process (exceed requested)	☑ Termination
Equipment: 1.Oven: E24-F0057				

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) **0.37Max.**	Final Test Current Spec. (A) **0.37Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **6624-7776**	Final Test Speed Spec. (RPM) **6624-7776**	Deviation (%)	Initial Test Noise Spec. (dB A) **51.5Max**	Final Test Noise Spec. (dB A) **51.5Max**	Deviation (%)
36	0.30	0.28	-6.7	7254	7264	0.1	47.6	47.6	0.0
37	0.31	0.27	-12.9	7204	7261	0.8	47.5	47.4	-0.2
38	0.29	0.29	0.0	7408	7248	-2.2	47.5	47.5	0.0
39	0.31	0.29	-6.5	7398	7345	-0.7	47.3	47.3	0.0
40	0.29	0.28	-3.4	7158	7378	3.1	47.8	47.5	-0.6
41	0.29	0.29	0.0	7349	7395	0.6	47.5	47.6	0.2
42	0.31	0.31	0.0	7468	7392	-1.0	47.6	47.5	-0.2
43	0.29	0.30	3.4	7426	7255	-2.3	47.9	47.4	-1.0
44	0.29	0.31	6.9	7355	7446	1.2	47.3	47.5	0.4
45	0.30	0.29	-3.3	7335	7310	-0.3	47.8	47.4	-0.8
46	0.29	0.29	0.0	7213	7307	1.3	48.0	47.6	-0.8
47	0.31	0.30	-3.2	7347	7337	-0.1	47.6	47.5	-0.2
48	0.30	0.30	0.0	7405	7384	-0.3	47.4	47.4	0.0
49	0.29	0.28	-3.4	7343	7466	1.7	47.6	47.5	-0.2
50	0.26	0.26	0.0	7130	7163	0.5	47.3	47.6	0.6
51	0.27	0.27	0.0	7164	7294	1.8	48.0	47.7	-0.6
52	0.30	0.30	0.0	7340	7467	1.7	47.5	47.4	-0.2
53	0.30	0.30	0.0	7430	7387	-0.6	47.9	47.5	-0.8
54	0.30	0.30	0.0	7334	7327	-0.1	47.6	47.6	0.0
55	0.30	0.29	-3.3	7350	7324	-0.4	47.3	47.3	0.0
56	0.30	0.29	-3.3	7530	7336	-2.6	47.5	47.0	-1.1
X-Bar	0.296	0.293	-	7345.5	7328.4	-	47.63	47.47	-
σ	0.010	0.011	-	83.685	81.544	-	0.238	0.142	-

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DG04FNL220	**1932.50**	**2005/8/22 5:00 AM**	**Guie.Lin**	**Gx.Xu**