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 ARxx or AFxx series suffixes. This test report applies to AFC**60x60x38 mm** series as the right table					

Representative Test P/N :AFC0612DE-AF00	
Equipment: 1.Oven: E24-F0030	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**, $MTTF \doteqdot 7 \times L10 =$ **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)
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)
2005/4/7 5:00 PM	2005/10/26 4:46 PM	☐ In process	☐ In process (exceed requested)	☑ Termination	**3478.0**

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**

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.)

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
DG05FNL068	**1370.00**	**2005/10/26 5:00 PM**	**Guie.Lin**	**Gx.Xu**

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)
3,478	2005/4/7 5:00 PM	2005/10/26 4:46 PM	56	0	**3478.0**

Representative Test P/N :AFC0612DE-AF00	Current Test Status	☐ In process	☐ In process (exceed requested)	☑ Termination

Equipment: 1.Oven: E24-F0030 | On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) 1.68Max.	Final Test Current Spec. (A) 1.68Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 11000-15%	Final Test Speed Spec. (RPM) 11000-15%	Deviation (%)	Initial Test Noise Spec. (dB A) 64.0Max	Final Test Noise Spec. (dB A) 64.0Max	Deviation (%)
1	1.41	1.45	2.8	12131	12086	-0.4	60.7	60.1	-1.0
2	1.37	1.45	5.8	11872	12038	1.4	60.5	59.9	-1.0
3	1.46	1.42	-2.7	12343	12162	-1.5	61.0	60.3	-1.1
4	1.31	1.32	0.8	11909	11924	0.1	61.2	60.1	-1.8
5	1.44	1.45	0.7	12348	12115	-1.9	60.3	60.2	-0.2
6	1.37	1.38	0.7	12043	11827	-1.8	60.5	60.4	-0.2
7	1.28	1.28	0.0	11791	11682	-0.9	60.7	60.5	-0.3
8	1.25	1.27	1.6	11705	11546	-1.4	60.9	60.0	-1.5
9	1.40	1.35	-3.6	12358	12051	-2.5	60.6	59.9	-1.2
10	1.31	1.32	0.8	11850	11927	0.6	60.4	60.2	-0.3
11	1.37	1.38	0.7	12043	11886	-1.3	61.2	60.4	-1.3
12	1.31	1.40	6.9	11597	11928	2.9	61.5	60.5	-1.6
13	1.46	1.48	1.4	12126	12045	-0.7	60.9	60.0	-1.5
14	1.37	1.35	-1.5	12139	11828	-2.6	60.5	60.1	-0.7
15	1.29	1.33	3.1	11853	11688	-1.4	61.3	60.5	-1.3
16	1.32	1.35	2.3	11974	11723	-2.1	60.8	60.5	-0.5
17	1.38	1.35	-2.2	12156	11701	-3.7	60.8	60.3	-0.8
18	1.41	1.46	3.5	12216	11988	-1.9	61.2	60.0	-2.0
19	1.44	1.54	6.9	12164	12192	0.2	61.3	59.9	-2.3
20	1.26	1.31	4.0	11653	11464	-1.6	60.7	60.3	-0.7
21	1.35	1.42	5.2	12179	11808	-3.0	60.4	60.5	0.2
22	1.44	1.38	-4.2	12198	11757	-3.6	60.7	60.4	-0.5
23	1.33	1.37	3.0	12048	11491	-4.6	60.5	60.6	0.2
24	1.38	1.48	7.2	12082	12099	0.1	60.9	60.3	-1.0
25	1.40	1.38	-1.4	11983	11998	0.1	61.3	60.2	-1.8
26	1.30	1.31	0.8	12039	11805	-1.9	61.5	59.9	-2.6
27	1.32	1.37	3.8	11915	11718	-1.7	60.8	60.4	-0.7
28	1.41	1.39	-1.4	11957	11859	-0.8	60.3	60.3	0.0
29	1.27	1.29	1.6	12155	11091	-8.8	61.0	60.6	-0.7
30	1.45	1.46	0.7	12159	11064	-9.0	61.2	60.4	-1.3
31	1.31	1.35	3.1	11764	11688	-0.6	60.8	60.3	-0.8
32	1.36	1.40	2.9	12150	11926	-1.8	60.6	59.9	-1.2
33	1.35	1.35	0.0	12088	11695	-3.3	60.9	60.1	-1.3
34	1.36	1.40	2.9	12101	11918	-1.5	61.4	60.0	-2.3
35	1.36	1.38	1.5	12127	11888	-2.0	60.8	60.4	-0.7

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG05FNL068	**1370.00**	**2005/10/26 5:00 PM**	**Guie.Lin**	**Gx.Xu**

DC FAN FUNCTION TEST RECORD
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3,478	2005/4/7 5:00 PM	2005/10/26 4:46 PM	56	0	**3478.0**

Representative Test P/N :AFC0612DE-AF00	Current Test Status	☐ In process	☐ In process (exceed requested)	☑ Termination

Equipment: 1.Oven: E24-F0030	On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) 1.68Max.	Final Test Current Spec. (A) 1.68Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 11000-15%	Final Test Speed Spec. (RPM) 11000-15%	Deviation (%)	Initial Test Noise Spec. (dB A) 64.0Max	Final Test Noise Spec. (dB A) 64.0Max	Deviation (%)
36	1.35	1.44	6.7	11800	12091	2.5	60.5	60.5	0.0
37	1.38	1.38	0.0	12192	11888	-2.5	60.9	60.3	-1.0
38	1.34	1.33	-0.7	11821	11716	-0.9	61.3	60.4	-1.5
39	1.40	1.37	-2.1	12193	11699	-4.1	61.6	60.2	-2.3
40	1.49	1.50	0.7	12610	11885	-5.7	60.5	60.3	-0.3
41	1.44	1.46	1.4	12161	12027	-1.1	60.8	60.2	-1.0
42	1.38	1.43	3.6	12061	11943	-1.0	60.7	60.3	-0.7
43	1.39	1.39	0.0	11929	11761	-1.4	61.2	60.1	-1.8
44	1.36	1.38	1.5	12140	11827	-2.6	61.4	60.0	-2.3
45	1.40	1.43	2.1	12096	11950	-1.2	60.9	60.6	-0.5
46	1.38	1.38	0.0	11891	11853	-0.3	61.1	59.9	-2.0
47	1.28	1.27	-0.8	11866	11087	-6.6	60.8	60.4	-0.7
48	1.39	1.41	1.4	12043	11850	-1.6	60.4	60.3	-0.2
49	1.30	1.36	4.6	12169	11847	-2.6	60.7	60.1	-1.0
50	1.39	1.40	0.7	11980	11903	-0.6	61.3	60.2	-1.8
51	1.42	1.41	-0.7	12149	11921	-1.9	60.6	60.4	-0.3
52	1.46	1.48	1.4	11964	11989	0.2	60.9	60.5	-0.7
53	1.31	1.35	3.1	11737	11736	0.0	61.3	60.4	-1.5
54	1.31	1.31	0.0	11638	11541	-0.8	60.5	60.3	-0.3
55	1.31	1.32	0.8	11960	11804	-1.3	61.2	60.5	-1.1
56	1.42	1.44	1.4	12107	11987	-1.0	60.7	60.4	-0.5
X-Bar	1.366	1.386	-	12030.6	11820.1	-	60.88	60.26	-
σ	0.058	0.060	-	196.386	242.413	-	0.343	0.206	-

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