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 AFB**120x120x38.0 mm** series as the right table	AFB1224VHE	AFB1212HHE-TP02			
	AFB1212HHE				
	AFB1224HHE				
Representative Test P/N : AFB1212VHE-F00(P81V)					
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)
2005/6/3 11:00 PM	2006/10/18 2:33 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
DG05FNL121	**5084.00**	**2006/10/18 3:00 PM**	**Nan.Yang**	**Gx.Xu**

DELTA ELECTRONICS, INC.

DC FAN FUNCTION TEST RECORD
FOR LIFE EXPERIMENT

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	AFB1212HHE				
	AFB1224HHE				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
6,956	2005/6/3 11:00 PM	2006/10/18 2:33 PM	56	0	**6956.0**

Representative Test P/N : AFB1212VHE-F00(P81V)	**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) **0.90Max.**	Final Test Current Spec. (A) **0.90Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **2944-3456**	Final Test Speed Spec. (RPM) **2944-3456**	Deviation (%)	Initial Test Noise Spec. (dB A) **51.0Max**	Final Test Noise Spec. (dB A) **51.0Max**	Deviation (%)
1	0.64	0.62	-3.1	3200	3036	-5.1	48.9	48.9	0.0
2	0.67	0.64	-4.8	3189	3064	-3.9	49.3	49.1	-0.4
3	0.71	0.68	-4.6	3230	3061	-5.2	49.5	48.7	-1.6
4	0.67	0.66	-1.9	3222	3097	-3.9	49.1	49.3	0.4
5	0.71	0.70	-2.0	3239	3092	-4.5	48.7	49.1	0.8
6	0.67	0.69	1.9	3151	3104	-1.5	49.3	49.1	-0.4
7	0.65	0.66	1.7	3212	3082	-4.0	49.1	49.5	0.8
8	0.67	0.65	-2.4	3183	3088	-3.0	49.4	48.6	-1.6
9	0.64	0.67	5.8	3176	3085	-2.9	49.5	48.8	-1.4
10	0.70	0.68	-2.7	3251	3161	-2.8	49.2	49.3	0.2
11	0.66	0.68	3.3	3188	3072	-3.6	48.8	49.5	1.4
12	0.66	0.63	-4.0	3228	3038	-5.9	49.4	49.1	-0.6
13	0.67	0.67	0.3	3210	3101	-3.4	49.1	49.3	0.4
14	0.69	0.68	-1.3	3182	3112	-2.2	49.5	48.7	-1.6
15	0.69	0.68	-2.6	3125	3134	0.3	48.7	48.8	0.2
16	0.64	0.67	5.8	3202	3065	-4.3	49.1	49.2	0.2
17	0.62	0.64	3.1	3165	3147	-0.6	49.4	48.8	-1.2
18	0.69	0.66	-4.5	3236	3065	-5.3	49.1	49.0	-0.2
19	0.70	0.65	-6.2	3258	3068	-5.8	49.5	48.7	-1.6
20	0.65	0.67	3.3	3180	3114	-2.1	49.3	49.1	-0.4
21	0.64	0.65	2.4	3218	3093	-3.9	48.7	49.3	1.2
22	0.71	0.64	-10.0	3277	3094	-5.6	49.1	48.9	-0.4
23	0.71	0.64	-9.3	3176	3061	-3.6	49.2	48.6	-1.2
24	0.65	0.67	2.3	3192	3067	-3.9	48.5	49.0	1.0
25	0.64	0.70	9.8	3216	3156	-1.9	49.3	49.3	0.0
26	0.67	0.64	-4.6	3225	3066	-4.9	49.4	48.8	-1.2
27	0.67	0.67	0.0	3225	3104	-3.8	49.1	49.1	0.0
28	0.65	0.66	0.6	3157	3077	-2.5	49.2	49.3	0.2
29	0.63	0.60	-4.8	3176	3129	-1.5	49.1	49.3	0.4
30	0.65	0.63	-3.1	3209	3099	-3.4	48.8	49.0	0.4
31	0.63	0.68	8.8	3201	3131	-2.2	49.4	48.7	-1.4
32	0.67	0.66	-1.5	3218	3126	-2.9	49.1	49.3	0.4
33	0.67	0.63	-5.8	3085	3087	0.1	49.5	49.1	-0.8
34	0.67	0.64	-5.1	3203	3083	-3.7	49.2	49.3	0.2
35	0.66	0.70	7.3	3198	3164	-1.1	48.9	48.9	0.0

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG05FNL121	**5084.00**	**2006/10/18 3:00 PM**	**Nan.Yang**	**Gx.Xu**

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	AFB1212HHE				
	AFB1224HHE				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
6,956	2005/6/3 11:00 PM	2006/10/18 2:33 PM	56	0	**6956.0**

Representative Test P/N : AFB1212VHE-F00(P81V)	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) **0.90Max.**	Final Test Current Spec. (A) **0.90Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **2944-3456**	Final Test Speed Spec. (RPM) **2944-3456**	Deviation (%)	Initial Test Noise Spec. (dB A) **51.0Max**	Final Test Noise Spec. (dB A) **51.0Max**	Deviation (%)
36	0.64	0.70	8.9	3161	3120	-1.3	48.5	48.5	0.0
37	0.68	0.60	-10.8	3224	3136	-2.7	49.3	49.1	-0.4
38	0.63	0.61	-2.6	3169	3088	-2.6	49.5	48.7	-1.6
39	0.64	0.68	7.2	3209	3091	-3.7	49.0	49.3	0.6
40	0.74	0.67	-10.3	3277	3089	-5.7	48.9	49.0	0.2
41	0.62	0.65	4.5	3123	3090	-1.1	49.6	48.7	-1.8
42	0.69	0.64	-6.0	3245	3058	-5.8	49.1	48.9	-0.4
43	0.67	0.64	-4.5	3220	3067	-4.8	48.8	49.2	0.8
44	0.66	0.64	-3.5	3198	3110	-2.8	49.2	49.5	0.6
45	0.67	0.66	-2.1	3145	3109	-1.1	49.4	48.7	-1.4
46	0.60	0.67	10.8	3160	3053	-3.4	49.0	49.1	0.2
47	0.67	0.69	2.5	3234	3112	-3.8	49.3	48.9	-0.8
48	0.65	0.63	-2.8	3221	3109	-3.5	49.5	49.5	0.0
49	0.66	0.69	4.4	3106	3095	-0.4	49.1	48.7	-0.8
50	0.69	0.65	-6.2	3176	3078	-3.1	48.7	48.5	-0.4
51	0.66	0.67	0.8	3195	3125	-2.2	49.3	48.9	-0.8
52	0.71	0.64	-10.4	3158	3104	-1.7	49.0	49.3	0.6
53	0.66	0.66	0.2	3120	3104	-0.5	49.4	49.0	-0.8
54	0.69	0.66	-4.7	3141	3096	-1.4	49.1	48.7	-0.8
55	0.72	0.66	-7.9	3174	3147	-0.9	49.5	49.1	-0.8
56	0.66	0.69	3.6	3220	3175	-1.4	49.2	49.3	0.2
X-Bar	0.666	0.658	-	3194.3	3097.8	-	49.16	49.02	-
σ	0.028	0.024	-	40.617	31.378	-	0.273	0.273	-

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DG05FNL121	**5084.00**	**2006/10/18 3:00 PM**	**Nan.Yang**	**Gx.Xu**