DC FAN LIFE EXPERIMENT REPORT

DELTA ELECTRONICS, INC.

Available for these models with lower speed and same physical structure. All model may be followed by AFxx or ARxx series suffixes. This test report applies to **AFB70x70x25.4mm** series as the right table	**AFB0712SH**	**AFB0712VH**	**AFB0712HH**		
	AFB0724SH	**AFB0724VH**	**AFB0724HH**		

Representative Test P/N : **AFB0712SH-AF00**	
Equipment: **1.Oven: E24-F0035**	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)
2003/10/28 3:00 PM	2004/4/9 5:46 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. **Basically , MTBF is equal to MTTF , they use same formula to work out a life data.**)

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 Restult

☑ **Accept**

☐ **Reject**

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG03FNL157	**461.00**	**2004/4/9 6:00 PM**	**Huiling.Fu**	**Even.Liu**

Note: The test sample equivalent to STD , Part number: AFB0712SH-AF00

DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

DELTA ELECTRONICS, INC.

AFB0712SH	AFB0712VH	AFB0712HH
AFB0724SH	AFB0724VH	AFB0724HH

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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	2003/10/28 3:00 PM	2004/4/9 5:46 PM	56	O	3478.0

Representative Test P/N :AFB0712SH-AF00

Current Test Status: ☐ In process　☐ In process (exceed requested)　☒ Termination

Equipment: 1.Oven: E24-F0035

On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) 0.84Max.	Final Test Current Spec. (A) 0.84Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 5796-6804	Final Test Speed Spec. (RPM) 5796-6804	Deviation (%)	Initial Test Noise Spec. (dB A) 52.0Max	Final Test Noise Spec. (dB A) 52.0Max	Deviation (%)
1	0.61	0.62	1.6	6480	6367	-1.7	51.7	51.5	-0.4
2	0.61	0.62	1.6	6507	6369	-2.1	51.6	51.4	-0.4
3	0.62	0.63	1.6	6425	6397	-0.4	51.5	51.3	-0.4
4	0.63	0.64	1.6	6454	6428	-0.4	51.8	51.6	-0.4
5	0.63	0.63	0.0	6533	6530	0.0	52.0	51.4	-1.2
6	0.64	0.63	0.0	6524	6509	-0.2	51.9	51.6	-0.6
7	0.63	0.62	0.0	6399	6480	1.3	51.7	51.3	-0.8
8	0.62	0.63	3.3	6423	6377	-0.7	51.8	51.3	-1.0
9	0.61	0.62	0.0	6401	6382	-0.3	51.9	51.5	-0.8
10	0.62	0.62	0.0	6467	6455	-0.2	51.9	51.4	-1.0
11	0.62	0.64	3.2	6554	6320	-3.6	51.7	51.1	-1.2
12	0.62	0.62	1.6	6475	6414	-0.9	51.6	51.2	-0.8
13	0.61	0.61	-1.6	6429	6376	-0.8	52.0	51.3	-1.3
14	0.62	0.63	5.0	6433	6356	-1.2	51.5	51.4	-0.2
15	0.60	0.60	-3.2	6391	6367	-0.4	51.8	51.0	-1.5
16	0.62	0.62	0.0	6457	6376	-1.3	51.7	51.6	-0.2
17	0.62	0.62	-1.6	6472	6400	-1.1	51.4	51.4	0.0
18	0.63	0.64	3.2	6479	6397	-1.3	51.6	51.5	-0.2
19	0.62	0.62	0.0	6500	6410	-1.4	51.8	51.2	-1.2
20	0.62	0.62	-1.6	6444	6446	0.0	51.7	51.1	-1.2
21	0.63	0.63	0.0	6376	6375	0.0	51.6	51.3	-0.6
22	0.62	0.61	-1.6	6398	6458	0.9	51.5	51.2	-0.6
23	0.61	0.62	1.6	6492	6421	-1.1	51.6	51.3	-0.6
24	0.62	0.61	-1.6	6384	6429	0.7	51.7	51.4	-0.6
25	0.61	0.61	0.0	6469	6412	-0.9	51.8	51.6	-0.4
26	0.62	0.62	0.0	6425	6406	-0.3	51.6	51.5	-0.2
27	0.65	0.63	-3.1	6448	6451	0.0	51.8	51.3	-1.0
28	0.60	0.60	0.0	6432	6338	-1.5	51.5	51.3	-0.4
29	0.62	0.62	0.0	6404	6364	-0.6	51.8	51.4	-0.8
30	0.64	0.64	0.0	6483	6437	-0.7	51.7	51.6	-0.2
31	0.63	0.63	0.0	6449	6409	-0.6	51.6	51.5	-0.2
32	0.61	0.62	1.6	6391	6313	-1.2	51.7	51.2	-1.0
33	0.63	0.64	1.6	6471	6477	0.1	51.4	51.1	-0.6
34	0.62	0.62	0.0	6438	6377	-0.9	51.5	51.3	-0.4
35	0.62	0.62	0.0	6452	6427	-0.4	51.3	51.3	0.0

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG03FNL157	461.00	2004/4/9 6:00 PM	Huiling.Fu	Even.Liu

DC FAN FUNCTION TEST RECORD

FOR LIFE EXPERIMENT

DELTA ELECTRONICS, INC.

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AFB0712SH	AFB0712VH	AFB0712HH		
AFB0724SH	AFB0724VH	AFB0724HH		

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2003/10/28 3:00 PM	2004/4/9 5:46 PM	56	O	3478.0

Representative Test P/N :AFB0712SH-AF00		Current Test Status	☐ In process	☐ In process (exceed requested)	☐ Termination

Equipment: 1.Oven: E24-F0035	On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) 0.84Max.	Final Test Current Spec. (A) 0.84Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 5796-6804	Final Test Speed Spec. (RPM) 5796-6804	Deviation (%)	Initial Test Noise Spec. (dB A) 52.0Max	Final Test Noise Spec. (dB A) 52.0Max	Deviation (%)
36	0.60	0.60	0.0	6372	6393	0.3	51.6	51.4	-0.4
37	0.62	0.62	0.0	6395	6378	-0.3	51.7	51.4	-0.6
38	0.62	0.62	0.0	6462	6496	0.5	51.8	51.4	-0.8
39	0.63	0.64	1.6	6458	6451	-0.1	51.5	51.3	-0.4
40	0.61	0.63	3.3	6426	6352	-1.2	51.7	51.8	0.2
41	0.61	0.63	3.3	6490	6372	-1.8	51.8	51.5	-0.6
42	0.64	0.65	1.6	6495	6476	-0.3	51.6	51.2	-0.8
43	0.63	0.63	0.0	6491	6420	-1.1	51.7	51.6	-0.2
44	0.65	0.65	0.0	6562	6492	-1.1	51.3	51.3	0.0
45	0.63	0.63	0.0	6440	6319	-1.9	51.4	51.4	0.0
46	0.66	0.68	3.0	6593	6472	-1.8	51.6	51.6	0.0
47	0.64	0.66	3.1	6545	6374	-2.6	51.3	51.7	0.8
48	0.63	0.64	1.6	6477	6429	-0.7	51.7	51.3	-0.8
49	0.65	0.65	0.0	6606	6458	-2.2	51.6	51.2	-0.8
50	0.63	0.65	3.2	6555	6423	-2.0	51.8	51.2	-1.2
51	0.62	0.62	0.0	6390	6429	0.6	51.5	51.4	-0.2
52	0.63	0.64	1.6	6493	6418	-1.2	51.9	51.6	-0.6
53	0.60	0.59	-1.7	6382	6462	1.3	51.4	51.3	-0.2
54	0.63	0.64	1.6	6572	6395	-2.7	51.6	51.2	-0.8
55	0.61	0.62	1.6	6421	6404	-0.3	51.8	51.1	-1.4
56	0.59	0.60	1.7	6260	6256	-0.1	51.3	51.7	0.8
X-Bar	0.623	0.627	-	6458.5	6409.3	-	51.65	51.38	-
	0.014	0.016	-	63.291	53.141	-	0.176	0.174	-

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