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 **AFB60x60x20 mm** series as the right table	AFB0612SHD-A				
	AFB0612VHD-A				
Representative Test P/N :AFB0612EHD-AF00					
Equipment: 1.Oven: E24-F0031			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)
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)
2005/2/27 4:00 PM	2005/8/13 12:46 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 decrease 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
DG05FNL026	527.0	2005/8/13 1:00 PM	Guie.Lin	gx.xu

DELTA ELECTRONICS, INC.

DC FAN FUNCTION TEST RECORD
FOR LIFE EXPERIMENT

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 AFB60x60x20 mm series as the right table	AFB0612SHD-A			
	AFB0612VHD-A			

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2005/2/27 4:00 PM	2005/8/13 12:46 PM	56	0	**3478.0**

Representative Test P/N :AFB0612EHD-AF00	Current Test Status	☐ In process	☐ In process (exceed requested)	☑ Termination
Equipment: 1.Oven: E24-F0031		On/Off Cycles: Every 500 hours		

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) **0.36Max.**	Final Test Current Spec. (A) **0.36Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **6072-7128**	Final Test Speed Spec. (RPM) **6072-7128**	Deviation (%)	Initial Test Noise Spec. (dB A) **49.0Max**	Final Test Noise Spec. (dB A) **49.0Max**	Deviation (%)
1	0.28	0.28	0.0	6605	6672	1.0	45.4	44.5	-2.0
2	0.29	0.29	0.0	6731	6754	0.3	44.5	44.2	-0.7
3	0.29	0.30	3.4	6741	6714	-0.4	45.0	44.0	-2.2
4	0.30	0.29	-3.3	6705	6640	-1.0	45.2	44.2	-2.2
5	0.29	0.29	0.0	6554	6524	-0.5	44.9	44.1	-1.8
6	0.29	0.30	3.4	6677	6587	-1.3	45.2	43.7	-3.3
7	0.28	0.28	0.0	6677	6617	-0.9	45.4	44.4	-2.2
8	0.29	0.29	0.0	6661	6595	-1.0	44.5	43.9	-1.3
9	0.30	0.29	-3.3	6644	6718	1.1	44.9	44.1	-1.8
10	0.29	0.28	-3.4	6737	6770	0.5	44.6	44.3	-0.7
11	0.28	0.28	0.0	6669	6647	-0.3	45.0	43.4	-3.6
12	0.29	0.29	0.0	6604	6649	0.7	44.5	44.2	-0.7
13	0.28	0.29	3.6	6653	6585	-1.0	44.9	44.0	-2.0
14	0.28	0.28	0.0	6620	6424	-3.0	44.6	44.3	-0.7
15	0.29	0.28	-3.4	6427	6447	0.3	45.0	44.1	-2.0
16	0.29	0.29	0.0	6502	6526	0.4	45.2	43.2	-4.4
17	0.30	0.30	0.0	6619	6562	-0.9	45.3	43.7	-3.5
18	0.28	0.27	-3.6	6651	6818	2.5	45.5	44.0	-3.3
19	0.29	0.28	-3.4	6666	6665	0.0	45.0	43.5	-3.3
20	0.28	0.29	3.6	6775	6631	-2.1	44.2	44.2	0.0
21	0.28	0.29	3.6	6645	6676	0.5	44.8	44.3	-1.1
22	0.29	0.28	-3.4	6694	6627	-1.0	44.6	43.6	-2.2
23	0.29	0.28	-3.4	6645	6678	0.5	44.6	44.2	-0.9
24	0.29	0.28	-3.4	6677	6720	0.6	44.5	43.2	-2.9
25	0.28	0.28	0.0	6668	6702	0.5	45.2	43.7	-3.3
26	0.29	0.29	0.0	6665	6712	0.7	45.3	43.5	-4.0
27	0.29	0.29	0.0	6519	6579	0.9	44.6	44.1	-1.1
28	0.28	0.28	0.0	6429	6527	1.5	45.2	43.8	-3.1
29	0.29	0.28	-3.4	6746	6821	1.1	45.3	44.1	-2.6
30	0.30	0.28	-6.7	6744	6690	-0.8	45.0	44.3	-1.6
31	0.29	0.29	0.0	6518	6572	0.8	44.3	43.6	-1.6
32	0.29	0.27	-6.9	6622	6738	1.8	44.9	44.5	-0.9
33	0.28	0.28	0.0	6640	6744	1.6	45.5	43.6	-4.2
34	0.28	0.28	0.0	6689	6623	-1.0	44.6	43.9	-1.6
35	0.28	0.28	0.0	6705	6623	-1.2	44.8	44.0	-1.8

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG05FNL026	**527.00**	**2005/8/13 1:00 PM**	**Guie.Lin**	**gx.xu**

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DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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 AFB60x60x20 mm series as the right table	AFB0612SHD-A			
	AFB0612VHD-A			

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)	
3,478	2005/2/27 4:00 PM	2005/8/13 12:46 PM	56	0	**3478.0**	
Representative Test P/N :AFB0612EHD-AF00		**Current Test Status**	☐ In process	☐ In process (exceed requested)	☑ Termination	
Equipment: 1.Oven: E24-F0031			On/Off Cycles: Every 500 hours			

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) **0.36Max.**	Final Test Current Spec. (A) **0.36Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **6072-7128**	Final Test Speed Spec. (RPM) **6072-7128**	Deviation (%)	Initial Test Noise Spec. (dB A) **49.0Max**	Final Test Noise Spec. (dB A) **49.0Max**	Deviation (%)
36	0.29	0.29	0.0	6512	6593	1.2	44.7	43.6	-2.5
37	0.28	0.28	0.0	6659	6680	0.3	44.5	43.2	-2.9
38	0.28	0.28	0.0	6746	6623	-1.8	45.5	43.7	-4.0
39	0.28	0.28	0.0	6658	6542	-1.7	45.3	43.5	-4.0
40	0.29	0.30	3.4	6767	6778	0.2	44.8	44.1	-1.6
41	0.29	0.29	0.0	6665	6585	-1.2	44.5	43.9	-1.3
42	0.27	0.28	3.7	6665	6424	-3.6	45.0	44.4	-1.3
43	0.28	0.28	0.0	6453	6453	0.0	45.3	44.1	-2.6
44	0.28	0.28	0.0	6548	6515	-0.5	45.1	44.1	-2.2
45	0.28	0.28	0.0	6510	6534	0.4	44.0	44.2	0.5
46	0.30	0.30	0.0	6703	6857	2.3	44.5	44.0	-1.1
47	0.28	0.27	-3.6	6671	6716	0.7	44.2	43.8	-0.9
48	0.29	0.28	-3.4	6639	6617	-0.3	44.8	43.7	-2.5
49	0.29	0.28	-3.4	6723	6673	-0.7	45.0	43.2	-4.0
50	0.28	0.28	0.0	6610	6503	-1.6	44.9	44.1	-1.8
51	0.29	0.29	0.0	6723	6677	-0.7	44.3	44.2	-0.2
52	0.30	0.30	0.0	6775	6785	0.1	44.6	44.2	-0.9
53	0.29	0.29	0.0	6534	6616	1.3	45.2	44.0	-2.7
54	0.29	0.28	-3.4	6632	6545	-1.3	44.7	44.1	-1.3
55	0.28	0.28	0.0	6765	6766	0.0	44.9	43.9	-2.2
56	0.30	0.29	-3.3	6678	6782	1.6	44.2	44.0	-0.5
X-Bar	0.287	0.285	-	6645.4	6638.7	-	44.86	43.94	-
σ	0.007	0.008	-	87.063	103.262	-	0.377	0.337	-

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DG05FNL026	**527.00**	**2005/8/13 1:00 PM**	**Guie.Lin**	**gx.xu**