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 Fxx or Fxx series suffixes. This test report applies to **ASB40x40x10mm** series as the right table	ASB0424VHA-A	ASB0424VHA-7J01	ASB0412MA-9Y39	ASB0412LA-BZ41	ASB0412LA-BX09
	ASB0412MA-A	ASB0424HHA-9S09	ASB0412MA-AW20	ASB0412LA-BN17	ASB0412MA-DQ36
	ASB0412LA-A	ASB0424HHA-9S10	ASB0412LA-BQ41	ASB0412MA-CU80	ASB0412MA-AX01
	ASB0412HA-9Q23	ASB0412MA-9U72	ASB0412MA-BW70	ASB0412LA-BQ28	ASB0412HA-A

Representative Test P/N : ASB0412VHA-A

Equipment: 1.Oven: E24-F0031 ; 2. DC Source: E24-FD671 | **On/Off Cycles: Every 500 hours**

◎ **L_{10} Expectancy: 30,000 hours minimum @ fan rated voltage and the temperature of 40℃**

According to the equation for **Weibull distribution**, **MTTF ≒ 7×L10 = 210,000 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	1,490	5,490.0	773,510	110,501

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2007/5/10 4:00 PM	2007/11/25 3:58 PM	☐ In process	☐ In process (exceed requested)	☑ Termination	5490.0

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	22.63	2,187,818	312,545
30	16.00	1,547,021	221,003
40	8.00	773,510	110,501
45	5.66	546,954	78,136
50	4.00	386,755	55,251
60	2.00	193,378	27,625
70	1.00	96,689	13,813

Fan permission criteria for the measurement after test :
1. Speed can not drop of ≧ 15% below the original measured rpm.
2. Current cannot increase > 15% of original measure current.
3. Noise cannot >3dB over the original measure noise.

Test Result	Accept Reject

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG07FNL099	3285.50	2008/7/11	Nan Yang	Zenny Lei

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 Fxx or Fxx series suffixes. This test report applies to ASB40x40x10mm series as the right table

ASB0424VHA-A	ASB0424VHA-7J01	ASB0412MA-9Y39	ASB0412LA-BZ41	ASB0412LA-BX09
ASB0412MA-A	ASB0424HHA-9S09	ASB0412MA-AW20	ASB0412LA-BN17	ASB0412MA-DQ36
ASB0412LA-A	ASB0424HHA-9S10	ASB0412LA-BQ41	ASB0412MA-CU80	ASB0412MA-AX01
ASB0412HA-9Q23	ASB0412MA-9U72	ASB0412MA-BW70	ASB0412LA-BQ28	ASB0412HA-A

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
1,490	2007/5/10 4:00 PM	2007/11/25 3:58 PM	56	0	**5490.0**

Representative Test P/N : ASB0412VHA-A	Current Test Status	☐ In process	☐ In process (exceed requested)	☑ Termination

Equipment: 1.Oven: E24-F0031 ; 2. DC Source: E24-FD671 — On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (mA) **160Max.**	Final Test Current Spec. (mA) **160Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **7200-8800**	Final Test Speed Spec. (RPM) **7200-8800**	Deviation (%)	Initial Test Noise Spec. (dB A) **37.5Max**	Final Test Noise Spec. (dB A) **37.5Max**	Deviation **3 dBMax.**
1	85	55	-35.3	7440	8486	14.1	29.9	32.1	2.2
2	71	59	-16.9	7499	8074	7.7	29.6	32.2	2.6
3	87	66	-24.1	7400	7531	1.8	29.8	31.5	1.7
4	73	56	-23.3	7539	8407	11.5	29.5	31.6	2.1
5	85	66	-22.4	7504	7564	0.8	29.4	32.3	2.9
6	72	55	-23.6	7253	8427	16.2	29.3	32.0	2.7
7	86	66	-23.3	7384	7532	2.0	29.6	31.5	1.9
8	70	55	-21.4	7258	8438	16.3	29.8	31.8	2.0
9	84	58	-31.0	7611	8494	11.6	30.1	31.2	1.1
10	71	61	-14.1	7414	8455	14.0	29.4	32.0	2.6
11	84	57	-32.1	7503	8496	13.2	29.8	32.0	2.2
12	87	77	-11.5	7312	8596	17.6	29.5	31.5	2.0
13	72	64	-11.1	7358	8719	18.5	29.3	31.9	2.6
14	87	56	-35.6	7320	7837	7.1	29.7	32.1	2.4
15	71	62	-12.7	7406	8716	17.7	29.9	32.1	2.2
16	72	54	-25.0	7424	8429	13.5	29.5	31.5	2.0
17	85	53	-37.6	7470	8409	12.6	29.7	31.3	1.6
18	87	89	2.3	7507	8594	14.5	29.3	31.8	2.5
19	71	53	-25.4	7387	8329	12.8	29.5	32.0	2.5
20	88	55	-37.5	7436	8546	14.9	29.8	32.5	2.7
21	72	63	-12.5	7282	7347	0.9	29.6	31.5	1.9
22	70	55	-21.4	7478	8558	14.4	29.4	31.9	2.5
23	87	63	-27.6	7525	7311	-2.8	29.7	31.6	1.9
24	85	55	-35.3	7439	8602	15.6	29.3	32.1	2.8
25	89	58	-34.8	7448	8286	11.3	29.8	32.3	2.5
26	72	52	-27.8	7533	8381	11.3	29.5	32.1	2.6
27	87	62	-28.7	7495	7634	1.9	29.3	32.2	2.9
28	79	57	-27.8	7780	8356	7.4	29.6	32.2	2.6
29	87	88	1.1	7344	8569	16.7	29.5	32.2	2.7
30	85	55	-35.3	7533	8374	11.2	29.1	32.0	2.9
31	87	53	-39.1	7530	8541	13.4	29.9	31.8	1.9
32	86	56	-34.9	7427	8434	13.6	29.3	31.6	2.3
33	70	55	-21.4	7288	8478	16.3	29.8	32.0	2.2
34	72	52	-27.8	7395	8417	13.8	29.7	32.0	2.3
35	68	58	-14.7	7502	8481	13.0	30.1	32.1	2.0

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG07FNL099	**3285.50**	**2008/7/11**	**Nan Yang**	**Zenny Lei**

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 Fxx or Fxx series suffixes. This test report applies to ASB40x40x10mm series as the right table					
	ASB0424VHA-A	ASB0424VHA-7J01	ASB0412MA-9Y39	ASB0412LA-BZ41	ASB0412LA-BX09
	ASB0412MA-A	ASB0424HHA-9S09	ASB0412MA-AW20	ASB0412LA-BN17	ASB0412MA-DQ36
	ASB0412LA-A	ASB0424HHA-9S10	ASB0412LA-BQ41	ASB0412MA-CU80	ASB0412MA-AX01
	ASB0412HA-9Q23	ASB0412MA-9U72	ASB0412MA-BW70	ASB0412LA-BQ28	ASB0412HA-A

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
1,490	2007/5/10 4:00 PM	2007/11/25 3:58 PM	56	0	**5490.0**

Representative Test P/N : ASB0412VHA-A	**Current Test Status**	☐ In process	☐ In process (exceed requested)	☑ Termination
Equipment: 1.Oven: E24-F0031 ; 2. DC Source: E24-FD671		On/Off Cycles: Every 500 hours		

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (mA) **160Max.**	Final Test Current Spec. (mA) **160Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **7200-8800**	Final Test Speed Spec. (RPM) **7200-8800**	Deviation (%)	Initial Test Noise Spec. (dB A) **37.5Max**	Final Test Noise Spec. (dB A) **37.5Max**	Deviation **3 dBMax.**
36	86	64	-25.6	7321	7623	4.1	29.8	32.5	2.7
37	86	61	-29.1	7461	7633	2.3	29.3	32.1	2.8
38	87	57	-34.5	7467	8424	12.8	29.5	32.3	2.8
39	71	54	-23.9	7265	8597	18.3	29.1	29.3	0.2
40	70	68	-2.9	7558	7219	-4.5	29.6	31.5	1.9
41	86	55	-36.0	7205	8345	15.8	29.2	31.7	2.5
42	87	63	-27.6	7275	7903	8.6	29.5	32.2	2.7
43	87	54	-37.9	7487	8230	9.9	29.8	32.5	2.7
44	70	63	-10.0	7418	8547	15.2	29.7	31.9	2.2
45	83	61	-26.5	7418	8521	14.9	29.6	32.2	2.6
46	85	56	-34.1	7277	8420	15.7	29.4	32.1	2.7
47	71	55	-22.5	7246	8367	15.5	29.2	32.0	2.8
48	74	70	-5.4	7355	8597	16.9	29.3	32.0	2.7
49	86	54	-37.2	7348	8479	15.4	29.6	32.1	2.5
50	72	58	-19.4	7295	8458	15.9	29.8	32.2	2.4
51	71	59	-16.9	7388	8596	16.4	29.9	32.0	2.1
52	89	61	-31.5	7496	8547	14.0	29.3	31.6	2.3
53	73	56	-23.3	7407	8555	15.5	29.5	31.5	2.0
54	86	55	-36.0	7358	8569	16.5	29.4	31.5	2.1
55	87	70	-19.5	7384	8547	15.8	29.8	32.0	2.2
56	71	54	-23.9	7481	8469	13.2	29.7	31.9	2.2
X-Bar	79.7	59.8	-	7416.7	8294.5	-	29.57	31.89	-
σ	7.539	7.649	-	106.322	393.111	-	0.241	0.466	-

QE File No.	Time-out for function test or others (hrs)	Issued Date	Reported By	Approved By
DG07FNL099	**3285.50**	**2008/7/11**	**Nan Yang**	**Zenny Lei**