DELTA ELECTRONICS, INC.

DC FAN LIFE EXPERIMENT REPORT

Available for these models with lower speed and same physical structure. All model may be followed byRxx orFxx series suffixes. This test report applies to **THB 172x172x50.8 mm** series as the right table	THB1748BG				
Representative Test P/N : THB1748BG-9L77					
Equipment: 1.Oven: E24-F0116			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/Elevated Temperature 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	28	2.303	6,535	4,360.0	326,921	46,703

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2011/6/24 9:00 AM	2012/5/31 11:24 PM	☐ In process	☐ In process (exceed requested)	☑ Termination	4360.0

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	924,673	132,096
30	16.00	653,842	93,406
40	8.00	326,921	46,703
50	4.00	163,461	23,352
60	2.00	81,730	11,676
70	1.00	40,865	5,838

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
DG11FNL077	1687.50	2012/3/10	Nan Yang	Tim Yi

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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)
6,535	2011/6/24 9:00 AM	2012/5/31 11:24 PM	28	0	**4360.0**

Representative Test P/N : THB1748BG-9L77	**Current Test Status**	☐ In process	☐ In process (exceed requested)	☑ Termination
Equipment: 1.Oven: E24-F0116		On/Off Cycles: Every 500 hours		

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) **4.20 Max.**	Final Test Current Spec. (A) **4.20 Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **7200-8800**	Final Test Speed Spec. (RPM) **7200-8800**	Deviation (%)	Initial Test Noise Spec. (dB A) **79.0 Max**	Final Test Noise Spec. (dB A) **79.0 Max**	Deviation **3 dBMax.**
1	3. 37	3. 32	-1.3	8071	8094	0.3	73.8	73.4	-0.4
2	3. 45	3. 31	-4.0	8007	8020	0.2	73.7	73.9	0.2
3	3. 42	3. 34	-2.1	8003	8087	1.0	73.6	73.5	-0.1
4	3. 13	3. 31	5.7	8028	8048	0.2	73.5	73.6	0.1
5	3. 23	3. 35	3.7	8011	8003	-0.1	73.2	73.7	0.5
6	3. 42	3. 48	1.8	7998	8009	0.1	73.1	73.5	0.4
7	3. 30	3. 21	-2.6	8009	7978	-0.4	73.0	73.6	0.6
8	3. 23	3. 36	4.0	8034	8063	0.4	73.6	73.8	0.2
9	3. 37	3. 33	-1.0	8043	8054	0.1	73.3	73.6	0.3
10	3. 41	3. 50	2.6	7979	8045	0.8	73.1	73.4	0.3
11	3. 38	3. 34	-0.9	8048	8059	0.1	73.0	73.4	0.4
12	3. 26	3. 32	1.9	7997	8071	0.9	73.2	73.5	0.3
13	3. 31	3. 55	7.2	8036	8040	0.0	73.5	73.7	0.2
14	3. 23	3. 27	1.3	7982	8033	0.6	73.5	73.6	0.1
15	3. 27	3. 25	-0.6	8028	8045	0.2	73.7	73.5	-0.2
16	3. 23	3. 34	3.5	8011	8058	0.6	73.8	73.2	-0.6
17	3. 44	3. 45	0.5	7990	8021	0.4	73.6	73.5	-0.1
18	3. 52	3. 45	-1.9	8032	8049	0.2	73.1	73.4	0.3
19	3. 39	3. 31	-2.4	8012	8050	0.5	73.2	73.6	0.4
20	3. 29	3. 26	-1.1	8010	8043	0.4	73.5	73.5	0.0
21	3. 17	3. 48	9.6	7979	7984	0.1	73.7	73.6	-0.1
22	3. 41	3. 45	1.1	7997	8042	0.6	73.9	73.5	-0.4
23	3. 38	3. 44	1.9	7990	8023	0.4	73.8	73.4	-0.4
24	3. 30	3. 37	2.2	8033	8041	0.1	73.6	73.6	0.0
25	3. 32	3. 50	5.5	8048	8033	-0.2	73.5	73.5	0.0
26	3. 29	3. 59	9.2	8005	8061	0.7	73.7	73.4	-0.3
27	3. 35	3. 55	6.1	8057	8096	0.5	73.2	73.5	0.3
28	3. 47	3. 55	2.4	7993	8064	0.9	73.3	73.5	0.2
X-Bar	3.333	3.393	-	8015.4	8043.4	-	73.45	73.53	-
σ	0.094	0.105	-	24.625	28.610	-	0.271	0.139	-

QE File No.	Time-out for function test or others (hrs)	Issued Date	Reported By	Approved By
DG11FNL077	**1687.50**	**2012/3/10**	**Nan Yang**	**Tim Yi**