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 **FFC 92x92x25.4 mm** series as the right table	FFC0948BCKM				
	FFC0948BY7T				
Representative Test P/N : FFB0948B-AC63					
Equipment: 1.Oven: E24-F0059			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	56	2.303	3,478	21,478.0	3,026,131	432,304

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2010/8/12 11:00 AM	2012/7/2 9:16 PM	☐ In process	☐ In process (exceed requested)	☑ Termination	21478.0

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	8,559,190	1,222,741
30	16.00	6,052,262	864,609
40	8.00	3,026,131	432,304
50	4.00	1,513,065	216,152
60	2.00	756,533	108,076
70	1.00	378,266	54,038

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
DG10FNL109	13092.50	2014/8/2	NaNa.Wang	Tim.Yi

BGN（dBA）: 16.4 Temp（℃）：23.7

DC FAN FUNCTION TEST RECORD
FOR LIFE EXPERIMENT

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FFC0948BCKM				
FFC0948BY7T				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2010/8/12 11:00 AM	2012/7/2 9:16 PM	56	0	**21478.0**

Representative Test P/N : FFB0948B-AC63	Current Test Status	☐ In process	☐ In process (exceed requested)	☑ Termination

Equipment: 1.Oven: E24-F0059 — On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (mA) **200 Max.**	Final Test Current Spec. (mA) **200 Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **3510-4290**	Final Test Speed Spec. (RPM) **3510-4290**	Deviation (%)	Initial Test Noise Spec. (dB A) **53.5 Max**	Final Test Noise Spec. (dB A) **53.5 Max**	Deviation **3 dBMax.**
1	146	150	2.7	3957	3929	-0.7	49.2	49.7	0.5
2	150	159	6.0	3938	3909	-0.7	49.8	49.4	-0.4
3	141	146	3.5	3932	3895	-0.9	49.6	49.4	-0.2
4	145	160	10.3	3874	3967	2.4	49.4	49.3	-0.1
5	146	163	11.6	3912	3942	0.8	49.7	49.5	-0.2
6	142	159	12.0	3953	3971	0.5	49.5	49.9	0.4
7	140	145	3.6	3914	3898	-0.4	49.8	50.0	0.2
8	144	140	-2.8	3908	3892	-0.4	49.4	49.2	-0.2
9	137	155	13.1	3912	3928	0.4	49.7	49.5	-0.2
10	141	160	13.5	3945	3936	-0.2	49.5	49.7	0.2
11	150	143	-4.7	3932	3924	-0.2	49.9	49.9	0.0
12	141	144	2.1	3911	3938	0.7	49.3	49.0	-0.3
13	151	161	6.6	3943	3911	-0.8	49.5	49.2	-0.3
14	144	147	2.1	3903	3958	1.4	49.8	49.4	-0.4
15	143	161	12.6	3940	3965	0.6	49.6	49.6	0.0
16	146	149	2.1	3911	3926	0.4	49.9	49.8	-0.1
17	147	146	-0.7	3838	3898	1.6	49.3	50.0	0.7
18	150	142	-5.3	3887	3918	0.8	49.8	49.2	-0.6
19	143	162	13.3	3959	3964	0.1	49.5	49.4	-0.1
20	145	161	11.0	3959	3968	0.2	49.6	49.6	0.0
21	146	150	2.7	3935	3947	0.3	49.9	49.8	-0.1
22	148	143	-3.4	3933	3897	-0.9	49.6	50.0	0.4
23	141	160	13.5	3923	3907	-0.4	49.5	49.1	-0.4
24	145	149	2.8	3939	3951	0.3	49.9	49.3	-0.6
25	141	150	6.4	3901	3942	1.1	49.3	49.5	0.2
26	143	146	2.1	3918	3934	0.4	49.5	49.7	0.2
27	141	159	12.8	3909	3943	0.9	49.8	49.9	0.1
28	150	158	5.3	3851	3894	1.1	49.6	49.5	-0.1
29	150	143	-4.7	3886	3897	0.3	49.9	49.0	-0.9
30	143	157	9.8	3915	4091	4.5	49.3	49.2	-0.1
31	145	138	-4.8	3873	3891	0.5	49.2	49.6	0.4
32	141	159	12.8	3880	3900	0.5	49.6	49.8	0.2
33	142	145	2.1	3889	3900	0.3	49.8	49.0	-0.8
34	149	142	-4.7	3900	3905	0.1	49.5	49.3	-0.2
35	144	158	9.7	3911	3942	0.8	49.9	49.1	-0.8

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG10FNL109	**13092.50**	**2014/8/2**	**NaNa.Wang**	**Tim.Yi**

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DC FAN FUNCTION TEST RECORD
FOR LIFE EXPERIMENT

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	FFC0948BY7T				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)	
3,478	2010/8/12 11:00 AM	2012/7/2 9:16 PM	56	0	**21478.0**	
Representative Test P/N : FFB0948B-AC63		**Current Test Status**	☐ In process	☐ In process (exceed requested)	☑ Termination	
Equipment: 1.Oven: E24-F0059			On/Off Cycles: Every 500 hours			

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (mA) **200 Max.**	Final Test Current Spec. (mA) **200 Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **3510-4290**	Final Test Speed Spec. (RPM) **3510-4290**	Deviation (%)	Initial Test Noise Spec. (dB A) **53.5 Max**	Final Test Noise Spec. (dB A) **53.5 Max**	Deviation **3 dBMax.**
36	141	143	1.4	3884	3918	0.9	49.4	49.4	0.0
37	142	159	12.0	3947	3972	0.6	49.6	49.6	0.0
38	140	158	12.9	3891	3910	0.5	49.7	49.8	0.1
39	138	144	4.3	3956	3924	-0.8	49.5	50.0	0.5
40	140	155	10.7	3945	3973	0.7	49.8	49.1	-0.7
41	149	157	5.4	3909	3940	0.8	49.3	49.3	0.0
42	144	162	12.5	3908	3954	1.2	49.7	49.5	-0.2
43	144	163	13.2	3940	3948	0.2	49.4	49.7	0.3
44	142	146	2.8	3944	3941	-0.1	49.6	49.9	0.3
45	142	145	2.1	3888	3945	1.5	49.5	49.1	-0.4
46	142	145	2.1	3932	3898	-0.9	49.8	49.0	-0.8
47	143	144	0.7	3818	3892	1.9	49.6	49.5	-0.1
48	142	150	5.6	3893	3916	0.6	49.9	49.7	-0.2
49	144	141	-2.1	3945	3855	-2.3	49.5	49.9	0.4
50	146	146	0.0	3884	3853	-0.8	49.8	49.0	-0.8
51	142	146	2.8	3842	3898	1.5	49.4	49.2	-0.2
52	145	146	0.7	3942	3901	-1.0	49.5	49.4	-0.1
53	150	163	8.7	3909	3966	1.5	49.8	49.6	-0.2
54	144	158	9.7	3868	3949	2.1	49.4	49.8	0.4
55	141	160	13.5	3966	3963	-0.1	49.6	50.0	0.4
56	142	157	10.6	3946	3944	-0.1	49.6	49.1	-0.5
X-Bar	144.0	151.8	-	3913.4	3929.3	-	49.60	49.50	-
σ	3.357	7.657	-	33.238	36.489	-	0.200	0.315	-

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DG10FNL109	**13092.50**	**2014/8/2**	**NaNa.Wang**	**Tim.Yi**