



DC FAN LIFE EXPERIMENT REPORT

Available for these models with lower speed and same physical structure. All model may be followed by Rxx or Fxx series suffixes. This test report applies to **THB 92x92x38.0 mm** series as the right table

Representative Test P/N : THB0948AE
Equipment: 1.Oven: E24-T0159 On/Off Cycles: Every 500 hours

☉ **L₁₀ Expectancy: 70,000 hours minimum @ fan rated voltage and the temperature of 40°C**
 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,

$$t = 1.036 \times \text{MTTF} \times [(B_{r,c}) \div n]^{0.91} \div A_F, \text{ and } A_F = 2^{(T_s - T_u)/10}$$

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 (°C)	Unstress Temperature Tu (°C)	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 °C (hours)	Verified L ₁₀ 40 °C (hours)
70	40	8.00	56	2.303	3,478	6,478.0	912,714	130,388

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2009/12/16 2:00 PM	2010/11/29 8:16 AM	<input type="checkbox"/> In process	<input checked="" type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination	6478.0

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' L₁₀ 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 (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	22.63	2,581,546	368,792
30	16.00	1,825,428	260,775
40	8.00	912,714	130,388
50	4.00	456,357	65,194
60	2.00	228,179	32,597
70	1.00	114,089	16,298

- Fan permission criteria for the measurement after test :
- Speed can not drop of $\geq 15\%$ below the original measured rpm.
 - Current cannot increase $> 15\%$ of original measure current.
 - Noise cannot $> 3\text{dB}$ over the original measure noise.

Test Result	<input checked="" type="checkbox"/> Accept <input type="checkbox"/> Reject
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QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG09FNL182	4868.50	2011/4/13	Nan Yang	Long Zhao



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)
3,478	2009/12/16 2:00 PM	2010/11/29 8:16 AM	56	0	6478.0
Representative Test P/N : THB0948AE			Current Test Status		<input type="checkbox"/> In process <input checked="" type="checkbox"/> In process (exceed requested) <input type="checkbox"/> Termination
Equipment: 1.Oven: E24-T0159				On/Off Cycles: Every 500 hours	

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec.	Final Test Current Spec.	Deviation (%)	Initial Test Speed Spec.	Final Test Speed Spec.	Deviation (%)	Initial Test Noise Spec.	Final Test Noise Spec.	Deviation
	(mA) 910 Max.	(mA) 910 Max.		(RPM) 11700-14300	(RPM) 11700-14300		(dB A) 75.0 Max	(dB A) 75.0 Max	
1	789	731	-7.4	12899	13114	1.7	73.4	71.5	-1.9
2	795	724	-8.9	12962	13149	1.4	73.2	71.1	-2.1
3	796	758	-4.8	12999	13173	1.3	73.6	71.4	-2.2
4	802	770	-4.0	13012	13426	3.2	74.1	71.2	-2.9
5	810	742	-8.4	13052	13422	2.8	73.3	71.3	-2.0
6	795	748	-5.9	13036	13216	1.4	73.7	71.2	-2.5
7	796	719	-9.7	12899	13063	1.3	73.5	71.3	-2.2
8	799	734	-8.1	12875	13099	1.7	73.8	71.2	-2.6
9	812	720	-11.3	12969	13333	2.8	73.4	71.6	-1.8
10	802	737	-8.1	12953	13150	1.5	73.9	71.7	-2.2
11	812	722	-11.1	12946	13106	1.2	73.7	71.6	-2.1
12	806	723	-10.3	13058	13008	-0.4	73.3	71.9	-1.4
13	809	737	-8.9	13036	13126	0.7	73.8	70.8	-3.0
14	788	728	-7.6	13105	13102	0.0	73.4	71.7	-1.7
15	805	744	-7.6	13077	13170	0.7	73.5	71.4	-2.1
16	803	718	-10.6	13172	13172	0.0	73.7	71.2	-2.5
17	796	730	-8.3	12892	13078	1.4	73.3	71.1	-2.2
18	792	714	-9.8	12982	13154	1.3	73.5	71.0	-2.5
19	791	744	-5.9	12942	13252	2.4	73.4	71.2	-2.2
20	805	726	-9.8	12945	13072	1.0	73.6	71.3	-2.3
21	807	801	-0.7	13036	13055	0.1	73.3	71.2	-2.1
22	806	735	-8.8	13146	13140	0.0	73.8	71.9	-1.9
23	803	746	-7.1	13126	13321	1.5	73.4	71.4	-2.0
24	789	762	-3.4	13142	13210	0.5	73.6	71.9	-1.7
25	792	751	-5.2	12952	13126	1.3	73.9	71.8	-2.1
26	819	719	-12.2	12977	13090	0.9	73.7	71.2	-2.5
27	791	741	-6.3	12968	13184	1.7	73.5	71.6	-1.9
28	790	741	-6.2	12977	13075	0.8	73.3	71.8	-1.5
29	789	735	-6.8	12869	13187	2.5	73.7	71.4	-2.3
30	792	725	-8.5	12888	13080	1.5	74.0	71.2	-2.8
31	802	740	-7.7	12912	13174	2.0	73.4	71.1	-2.3
32	803	740	-7.8	13045	13231	1.4	73.6	71.6	-2.0
33	805	724	-10.1	13023	13113	0.7	73.3	71.2	-2.1
34	795	724	-8.9	12946	13118	1.3	73.8	71.1	-2.7
35	792	734	-7.3	12978	13185	1.6	73.8	71.4	-2.4

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
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Equipment: 1.Oven: E24-T0159				On/Off Cycles: Every 500 hours	

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (mA) 910 Max.	Final Test Current Spec. (mA) 910 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 11700-14300	Final Test Speed Spec. (RPM) 11700-14300	Deviation (%)	Initial Test Noise Spec. (dB A) 75.0 Max	Final Test Noise Spec. (dB A) 75.0 Max	Deviation 3 dBMax.
36	812	741	-8.7	13158	13182	0.2	73.6	71.2	-2.4
37	813	826	1.6	12859	13326	3.6	73.3	71.2	-2.1
38	792	780	-1.5	12942	13239	2.3	73.4	71.2	-2.2
39	795	734	-7.7	12912	13113	1.6	73.7	71.2	-2.5
40	796	743	-6.7	12902	13273	2.9	73.5	71.1	-2.4
41	792	752	-5.1	13025	13216	1.5	73.3	71.4	-1.9
42	789	746	-5.4	13059	13329	2.1	73.6	71.2	-2.4
43	802	727	-9.4	13078	13047	-0.2	73.4	71.6	-1.8
44	812	741	-8.7	12942	13133	1.5	73.9	71.4	-2.5
45	811	737	-9.1	12963	13249	2.2	73.5	71.2	-2.3
46	792	737	-6.9	12945	13197	1.9	73.3	71.1	-2.2
47	792	741	-6.4	13025	13078	0.4	73.8	71.0	-2.8
48	792	743	-6.2	13125	13152	0.2	73.6	71.2	-2.4
49	795	728	-8.4	13100	13180	0.6	73.4	71.1	-2.3
50	819	746	-8.9	13045	13321	2.1	73.7	71.2	-2.5
51	802	762	-5.0	13077	13418	2.6	73.3	71.4	-1.9
52	819	739	-9.8	13095	13249	1.2	73.8	71.3	-2.5
53	810	720	-11.1	13045	13041	0.0	73.5	71.2	-2.3
54	792	724	-8.6	13138	13196	0.4	73.7	71.3	-2.4
55	812	721	-11.2	13067	13277	1.6	73.4	71.6	-1.8
56	793	747	-5.8	13128	13223	0.7	73.6	71.4	-2.2
X-Bar	800.2	739.7	-	13007.6	13180.6	-	73.56	71.34	-
σ	8.928	19.791	-	84.116	98.464	-	0.213	0.248	-

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