



# 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 THA 40x40x28.0 mm series as the right table	THA0412AD-TZW3			

<b>Representative Test P/N : THA0412HN</b>	
<b>Equipment: 1.Oven: E24-F0109</b>	On/Off Cycles: Every 500 hours

☉ **L<sub>10</sub> 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<sub>r,c</sub>) 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 <sub>F</sub>	Quantity of Test Devices n (pcs)	Poisson Distribution Factor B <sub>r,c</sub>	Required test time with zero failure t (hours)	Actual test time with zero failure t (hours)	Verified MTTF 40 °C (hours)	Verified L <sub>10</sub> 40 °C (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)
2009/9/14 10:00 AM	2010/3/23 2:46 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> 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<sub>10</sub> 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 <sub>F</sub>	Estimated MTTF (hours)	Estimated L <sub>10</sub> (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. 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.

<b>Test Result</b>	<input checked="" type="checkbox"/> <b>Accept</b>
	<input type="checkbox"/> <b>Reject</b>

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG09FNL133	1087.00	2010/3/26	Nan Yang	Zenny Lei



# DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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applies to THA 40x40x28.0 mm series as the right table

THA0412AD-TZW3			

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2009/9/14 10:00 AM	2010/3/23 2:46 PM	56	0	<b>3478.0</b>

Representative Test P/N : THA0412HN	<b>Current Test Status</b>	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination
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Equipment: 1.Oven: E24-F0109 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 ) <b>1320 Max.</b>	( mA ) <b>1320 Max.</b>		( RPM ) <b>17480-20520</b>	( RPM ) <b>17480-20520</b>		( dB A ) <b>63.0 Max</b>	( dB A ) <b>63.0 Max</b>	
1	866	833	-3.8	18700	19006	1.6	56.8	58.3	1.5
2	882	855	-3.1	18796	18784	-0.1	57.0	58.1	1.1
3	890	852	-4.3	18995	18396	-3.2	56.7	58.5	1.8
4	889	836	-6.0	18847	18584	-1.4	57.2	58.4	1.2
5	890	887	-0.3	18708	19121	2.2	56.9	58.3	1.4
6	854	893	4.6	18346	19120	4.2	57.1	58.5	1.4
7	892	889	-0.3	17921	18458	3.0	56.7	58.4	1.7
8	862	903	4.8	18533	19227	3.7	56.5	58.5	2.0
9	899	845	-6.0	18915	18733	-1.0	56.8	58.6	1.8
10	894	870	-2.7	18945	18610	-1.8	57.0	58.4	1.4
11	893	857	-4.0	18333	18732	2.2	57.2	58.5	1.3
12	897	876	-2.3	18979	18721	-1.4	56.9	58.1	1.2
13	892	850	-4.7	18951	18819	-0.7	57.1	58.6	1.5
14	886	833	-6.0	19025	18334	-3.6	56.8	58.3	1.5
15	880	902	2.5	17708	18158	2.5	57.3	58.4	1.1
16	867	881	1.6	18396	18998	3.3	57.1	58.2	1.1
17	910	865	-4.9	18845	19055	1.1	57.0	58.2	1.2
18	889	910	2.4	19026	19045	0.1	57.2	58.3	1.1
19	874	882	0.9	18936	18996	0.3	56.9	58.4	1.5
20	866	841	-2.9	18020	18574	3.1	57.3	58.5	1.2
21	876	894	2.1	19050	18681	-1.9	56.8	58.4	1.6
22	848	881	3.9	18071	18632	3.1	57.2	58.2	1.0
23	874	831	-4.9	18421	18346	-0.4	57.1	58.5	1.4
24	897	864	-3.7	18846	17921	-4.9	56.7	58.3	1.6
25	880	860	-2.3	19084	18795	-1.5	57.3	58.5	1.2
26	872	861	-1.3	18334	18979	3.5	56.4	58.1	1.7
27	896	895	-0.1	19007	18433	-3.0	57.0	58.4	1.4
28	890	845	-5.1	18082	18680	3.3	56.7	58.3	1.6
29	896	881	-1.7	19358	19189	-0.9	57.2	58.2	1.0
30	891	861	-3.4	18997	18698	-1.6	56.8	58.3	1.5
31	891	853	-4.3	18963	18346	-3.3	57.1	58.1	1.0
32	892	856	-4.0	18909	18421	-2.6	56.9	58.5	1.6
33	890	882	-0.9	18967	18508	-2.4	56.6	58.4	1.8
34	881	895	1.6	19285	18761	-2.7	57.0	58.3	1.3
35	829	825	-0.5	18108	18170	0.3	56.8	58.5	1.7

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG09FNL133	1087.00	2010/3/26	Nan Yang	Zenny Lei



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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	2009/9/14 10:00 AM	2010/3/23 2:46 PM	56	0	<b>3478.0</b>

Representative Test P/N : THA0412HN	Current Test Status	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination
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Equipment: 1.Oven: E24-F0109	On/Off Cycles: Every 500 hours
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### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (mA) 1320 Max.	Final Test Current Spec. (mA) 1320 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 17480-20520	Final Test Speed Spec. (RPM) 17480-20520	Deviation (%)	Initial Test Noise Spec. (dB A) 63.0 Max	Final Test Noise Spec. (dB A) 63.0 Max	Deviation 3 dBMax.
36	899	849	-5.6	19210	19185	-0.1	57.2	58.2	1.0
37	891	864	-3.0	18963	17921	-5.5	57.3	58.1	0.8
38	893	869	-2.7	19009	18171	-4.4	56.9	58.2	1.3
39	896	870	-2.9	18913	18863	-0.3	56.7	58.4	1.7
40	896	850	-5.1	17733	18304	3.2	57.0	58.3	1.3
41	887	832	-6.2	19005	18660	-1.8	56.9	58.1	1.2
42	889	872	-1.9	18934	18558	-2.0	57.1	58.5	1.4
43	893	880	-1.5	18945	17995	-5.0	56.6	58.4	1.8
44	892	896	0.4	18534	19259	3.9	57.0	58.5	1.5
45	894	867	-3.0	18959	19127	0.9	56.9	58.3	1.4
46	822	841	2.3	17933	18058	0.7	56.7	58.5	1.8
47	899	840	-6.6	19195	19021	-0.9	57.0	58.4	1.4
48	886	832	-6.1	18709	19180	2.5	56.8	58.2	1.4
49	872	832	-4.6	17933	18849	5.1	56.7	58.3	1.6
50	866	800	-7.6	17995	18545	3.1	56.5	58.4	1.9
51	890	825	-7.3	17958	18058	0.6	56.9	58.2	1.3
52	897	855	-4.7	17958	17908	-0.3	57.1	58.5	1.4
53	895	882	-1.5	19296	19181	-0.6	56.7	58.4	1.7
54	867	838	-3.3	18334	18929	3.2	57.2	58.0	0.8
55	882	853	-3.3	18671	19190	2.8	56.9	58.1	1.2
56	890	836	-6.1	17846	17584	-1.5	57.3	58.5	1.2
X-Bar	883.4	861.2	-	18650.7	18653.2	-	56.94	58.34	-
σ	16.728	24.130	-	460.650	409.933	-	0.228	0.150	-

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