



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 THD 92x92x38.0 mm series as the right table	THD0948HE-A			
	THD0948HE-ABGA			
	THD0948HE-AXHH			

Representative Test P/N : THD0948HE-DH31	Date Code: 4116PR
Equipment: 1.Oven: E24-F0030	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 T _s (°C) (Actual Test Temperature)	Unstress Temperature T _u (°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	4,360.0	614,300	87,757

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2014/2/13 8:00 AM	2014/10/5 10:46 AM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> 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' 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	1,737,502	248,215
30	16.00	1,228,600	175,514
40	8.00	614,300	87,757
45	5.66	434,376	62,054
50	4.00	307,150	43,879
60	2.00	153,575	21,939
70	1.00	76,787	10,970

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	<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
DG14FNL010	2141.00	2014/11/18	NaNa.Wang	Tim.Yi

BGN (dBA) :16.2

Temp (°C) : 24.0



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THD0948HE-A				
THD0948HE-ABGA				
THD0948HE-AXHH				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2014/2/13 8:00 AM	2014/10/5 10:46 AM	56	0	4360.0

Representative Test P/N : THD0948HE-DH31	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-F0030 On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) 1.25 Max.	Final Test Current Spec. (A) 1.25 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 12150-14300	Final Test Speed Spec. (RPM) 12150-14300	Deviation (%)	Initial Test Noise Spec. (dB A) 75.0 Max	Final Test Noise Spec. (dB A) 75.0 Max	Deviation
1	1.06	0.98	-7.7	13307	13496	1.4	68.9	71.1	2.2
2	1.17	1.01	-14.0	13041	13484	3.4	69.1	70.2	1.1
3	1.03	0.97	-5.8	13287	13505	1.6	69.6	70.9	1.3
4	1.02	0.99	-3.4	13363	13527	1.2	69.9	71.0	1.1
5	1.00	0.99	-0.9	13490	13480	-0.1	69.2	70.9	1.7
6	1.06	0.99	-6.5	13306	13489	1.4	69.9	70.5	0.6
7	1.12	0.99	-11.3	13218	13483	2.0	69.8	70.2	0.4
8	1.05	0.99	-5.8	13304	13476	1.3	69.0	70.4	1.4
9	1.09	1.01	-8.1	13074	13534	3.5	69.2	70.6	1.4
10	1.00	1.01	1.0	13465	13501	0.3	69.4	70.8	1.4
11	1.14	0.98	-14.2	12896	13468	4.4	69.6	71.0	1.4
12	1.05	0.98	-6.6	13435	13478	0.3	69.8	70.3	0.5
13	1.12	1.01	-9.2	13158	13531	2.8	68.9	70.5	1.6
14	1.12	1.01	-9.4	13067	13520	3.5	69.1	70.7	1.6
15	1.11	0.96	-13.3	13193	13532	2.6	69.3	70.9	1.6
16	1.09	0.98	-10.1	12998	13497	3.8	69.5	71.1	1.6
17	1.11	1.00	-9.8	13066	13532	3.6	69.7	70.2	0.5
18	1.13	0.97	-14.3	13202	13570	2.8	69.9	70.4	0.5
19	1.10	0.99	-10.3	13168	13486	2.4	69.0	70.6	1.6
20	1.13	0.99	-11.9	13213	13535	2.4	69.2	70.8	1.6
21	1.10	0.98	-11.0	13021	13511	3.8	69.4	71.0	1.6
22	1.18	1.00	-15.6	13078	13510	3.3	69.6	70.4	0.8
23	1.11	0.97	-12.7	13079	13521	3.4	69.8	70.2	0.4
24	1.15	1.01	-12.4	13187	13464	2.1	68.9	70.6	1.7
25	1.11	0.99	-11.3	13061	13525	3.6	69.1	70.8	1.7
26	1.11	0.99	-10.5	13118	13521	3.1	69.3	71.0	1.7
27	1.11	1.00	-10.5	13023	13533	3.9	69.5	70.5	1.0
28	1.13	1.02	-9.8	13127	13526	3.0	69.7	70.8	1.1
29	1.14	1.02	-10.3	13230	13555	2.5	69.0	70.3	1.3
30	1.08	0.97	-10.3	13073	13534	3.5	69.3	70.6	1.3
31	1.12	0.99	-12.2	13217	13494	2.1	69.5	70.4	0.9
32	1.11	1.00	-9.9	13039	13503	3.6	69.7	70.7	1.0

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG14FNL010	2141.00	2014/11/18	NaNa.Wang	Tim.Yi



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3,478	2014/2/13 8:00 AM	2014/10/5 10:46 AM	56	0	4360.0
Representative Test P/N : THD0948HE-DH31			Current Test Status	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested) <input checked="" type="checkbox"/> Termination
Equipment: 1.Oven: E24-F0030				On/Off Cycles: Every 500 hours	

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) 1.25 Max.	Final Test Current Spec. (A) 1.25 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 12150-14300	Final Test Speed Spec. (RPM) 12150-14300	Deviation (%)	Initial Test Noise Spec. (dB A) 75.0 Max	Final Test Noise Spec. (dB A) 75.0 Max	Deviation
33	1.07	0.99	-8.0	12989	13466	3.7	69.4	71.0	1.6
34	1.14	1.02	-10.4	13049	13073	0.2	69.6	70.8	1.2
35	1.12	0.98	-12.6	13161	13489	2.5	69.1	70.3	1.2
36	1.12	1.00	-10.8	13183	13508	2.5	68.9	70.5	1.6
37	1.09	0.98	-9.5	13076	13504	3.3	69.3	70.7	1.4
38	1.11	0.98	-11.4	13064	13510	3.4	69.5	70.9	1.4
39	1.11	0.99	-10.8	13167	13491	2.5	69.7	71.1	1.4
40	1.12	1.00	-10.6	13098	13486	3.0	69.9	70.2	0.3
41	1.12	1.00	-11.2	13138	13525	2.9	69.0	70.4	1.4
42	1.14	1.01	-11.5	13112	13468	2.7	69.2	70.6	1.4
43	1.10	1.00	-8.8	13071	13518	3.4	69.4	70.8	1.4
44	1.12	0.96	-14.2	13097	13518	3.2	69.6	71.0	1.4
45	1.13	1.04	-7.7	13151	13524	2.8	69.8	70.3	0.5
46	1.12	1.00	-10.9	13045	13507	3.5	68.9	70.5	1.6
47	1.15	0.97	-15.9	13293	13519	1.7	69.1	70.7	1.6
48	1.13	1.03	-9.4	13109	13467	2.7	69.3	70.9	1.6
49	1.13	1.00	-11.7	13121	13520	3.0	69.5	71.1	1.6
50	1.13	1.01	-11.1	13122	13514	3.0	69.7	70.5	0.8
51	1.11	1.01	-8.8	13165	13498	2.5	69.9	70.3	0.4
52	1.08	0.99	-8.8	13066	13503	3.3	69.0	70.7	1.7
53	1.12	1.00	-10.9	13151	13513	2.8	69.2	70.9	1.7
54	1.12	1.02	-9.7	13048	13491	3.4	69.4	71.1	1.7
55	1.13	1.00	-11.8	13099	13537	3.3	69.6	70.7	1.1
56	1.13	0.98	-13.3	13123	13493	2.8	69.8	71.0	1.2
X-Bar	1.11	0.99	-	13146.5	13499.3	-	69.40	70.67	-
σ	0.037	0.017	-	118.134	62.453	-	0.317	0.285	-

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DG14FNL010	2141.00	2014/11/18	NaNa.Wang	Tim.Yi