



# 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 208x208x50.8 mm series as the right table	THB2048HG-A				

<b>Representative Test P/N : THB2048HG-BL28</b>	
<b>Equipment: 1.Oven: E24-F0116</b>	On/Off Cycles: Every 500 hours

◎ **L<sub>10</sub> Expectancy: 50,000 hours minimum @ fan rated voltage and the temperature of 40°C**  
 According to the equation for **Weibull distribution**, **MTTF ≐ 7×L10 = 350,000 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 T <sub>s</sub> (°C) (Actual Test Temperature)	Unstress Temperature T <sub>u</sub> (°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	2,484	3,485.0	491,017	70,145

**Test Progress:**

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2012/12/6 2:00 PM	2013/4/23 8:07 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	3485.0

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	1,388,806	198,401
30	16.00	982,034	140,291
40	8.00	491,017	70,145
50	4.00	245,509	35,073
60	2.00	122,754	17,536
70	1.00	61,377	8,768

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>
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QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG12FNL174	834.00	2013/6/10	Chaoping.Duan	Tim.Yi



# DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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<b>Required Test Time (hrs)</b>	<b>Date for Test Beginning</b>	<b>Date for Test Termination</b>	<b>Sample Size (pcs):</b>	<b>Failure (pcs):</b>	<b>Current Total Test Time (hrs)</b>
2,484	2012/12/6 2:00 PM	2013/4/23 8:07 PM	56	0	<b>3485.0</b>

Representative Test P/N : THB2048HG-BL28	<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-F0116 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
	( A ) <b>7.0 Max.</b>	( A ) <b>7.0 Max.</b>		( RPM ) <b>6930-8470</b>	( RPM ) <b>6930-8470</b>		( dB A ) <b>82.0 Max</b>	( dB A ) <b>82.0 Max</b>	
1	4.88	3.86	-20.9	7698	7671	-0.4	78.1	76.5	-1.6
2	4.80	3.94	-17.8	7660	7678	0.2	77.9	76.3	-1.6
3	4.52	3.78	-16.5	7647	7667	0.3	77.8	76.9	-0.9
4	4.77	3.94	-17.4	7622	7697	1.0	78.4	76.6	-1.8
5	4.34	3.90	-10.2	7640	7665	0.3	78.1	76.2	-1.9
6	4.56	3.73	-18.3	7628	7671	0.6	77.7	76.8	-0.9
7	4.64	3.83	-17.3	7608	7674	0.9	78.4	76.4	-2.0
8	4.77	3.96	-17.0	7624	7716	1.2	78.0	76.1	-1.9
9	4.59	3.93	-14.5	7619	7686	0.9	78.5	76.7	-1.8
10	4.81	3.97	-17.4	7656	7705	0.6	77.9	76.2	-1.7
11	4.43	3.91	-11.8	7627	7692	0.9	78.2	76.9	-1.3
12	4.72	4.06	-13.9	7587	7679	1.2	78.6	76.4	-2.2
13	4.49	3.86	-14.1	7564	7639	1.0	78.1	77.0	-1.1
14	4.15	3.94	-5.0	7679	7686	0.1	77.8	76.5	-1.3
15	4.49	3.98	-11.4	7701	7668	-0.4	78.1	76.8	-1.3
16	4.59	3.92	-14.6	7661	7662	0.0	78.4	76.3	-2.1
17	4.34	3.81	-12.2	7690	7684	-0.1	78.5	76.9	-1.6
18	4.12	3.89	-5.4	7632	7660	0.4	78.2	76.5	-1.7
19	4.74	3.90	-17.7	7637	7688	0.7	78.7	77.0	-1.7
20	4.43	3.92	-11.6	7645	7653	0.1	78.3	76.4	-1.9
21	4.32	3.87	-10.4	7608	7653	0.6	78.6	77.1	-1.5
22	4.37	3.86	-11.7	7689	7716	0.4	78.0	76.4	-1.6
23	4.62	4.02	-12.8	7622	7691	0.9	77.7	76.9	-0.8
24	4.54	3.89	-14.4	7634	7683	0.6	78.3	76.3	-2.0
25	4.46	3.95	-11.5	7651	7690	0.5	77.9	76.2	-1.7
26	4.76	3.96	-16.8	7656	7696	0.5	78.1	76.8	-1.3
27	4.51	4.01	-11.1	7643	7688	0.6	78.4	76.5	-1.9
28	4.56	3.85	-15.6	7657	7706	0.6	78.2	76.3	-1.9
29	4.61	3.84	-16.7	7623	7680	0.7	78.3	76.8	-1.5
30	4.39	3.91	-11.0	7629	7666	0.5	78.0	77.0	-1.0
31	4.91	3.90	-20.7	7704	7648	-0.7	78.6	76.6	-2.0
32	4.69	4.01	-14.4	7624	7653	0.4	77.9	76.4	-1.5

<b>QE File No.</b>	<b>Time-out for function test or others (hours)</b>	<b>Issued Date</b>	<b>Reported By</b>	<b>Approved By</b>
DG12FNL174	834.00	2013/6/10	Chaoping.Duan	Tim.Yi



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2,484	2012/12/6 2:00 PM	2013/4/23 8:07 PM	56	0	<b>3485.0</b>
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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.	Final Test Current Spec.	Deviation (%)	Initial Test Speed Spec.	Final Test Speed Spec.	Deviation (%)	Initial Test Noise Spec.	Final Test Noise Spec.	Deviation 3 dBMax.
	(A) 7.0 Max.	(A) 7.0 Max.		(RPM) 6930-8470	(RPM) 6930-8470		(dB A) 82.0 Max	(dB A) 82.0 Max	
33	4.62	3.95	-14.5	7597	7714	1.5	78.3	76.7	-1.6
34	4.79	3.86	-19.5	7670	7660	-0.1	78.2	76.6	-1.6
35	4.42	3.93	-11.0	7661	7681	0.3	77.8	77.1	-0.7
36	4.56	3.97	-13.0	7608	7690	1.1	78.3	76.5	-1.8
37	4.66	3.81	-18.1	7612	7662	0.7	78.7	77.0	-1.7
38	4.79	3.92	-18.3	7669	7697	0.4	78.1	76.2	-1.9
39	4.54	3.93	-13.4	7607	7629	0.3	78.2	76.9	-1.3
40	4.59	3.81	-17.2	7624	7688	0.8	77.7	76.4	-1.3
41	4.34	3.92	-9.8	7627	7640	0.2	78.5	76.1	-2.4
42	4.38	3.80	-13.3	7617	7668	0.7	78.0	76.7	-1.3
43	4.70	3.84	-18.4	7612	7661	0.6	78.4	76.4	-2.0
44	4.71	3.97	-15.7	7656	7706	0.7	77.9	76.8	-1.1
45	4.40	3.75	-14.6	7596	7649	0.7	78.6	76.2	-2.4
46	4.43	3.94	-11.1	7665	7711	0.6	78.1	76.5	-1.6
47	4.77	3.78	-20.7	7669	7695	0.3	78.3	77.0	-1.3
48	4.35	3.95	-9.2	7614	7690	1.0	78.5	76.4	-2.1
49	4.69	4.39	-6.5	7596	7655	0.8	78.2	76.9	-1.3
50	4.57	3.76	-17.7	7640	7655	0.2	78.3	76.2	-2.1
51	4.04	3.93	-2.7	7665	7701	0.5	78.0	76.7	-1.3
52	4.70	4.04	-14.0	7616	7719	1.4	77.8	76.3	-1.5
53	4.70	3.89	-17.2	7623	7674	0.7	78.4	76.8	-1.6
54	4.60	3.84	-16.5	7627	7646	0.2	78.1	77.0	-1.1
55	4.75	3.96	-16.6	7686	7713	0.4	78.5	76.6	-1.9
56	4.68	4.16	-11.0	7643	7709	0.9	78.7	76.3	-2.4
X-Bar	4.6	3.9	-	7638.7	7679.0	-	78.20	76.59	-
$\sigma$	0.189	0.104	-	30.491	22.491	-	0.279	0.291	-

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