



# 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 60x60x38 mm series as the right table	THB0648BE			
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<b>Representative Test P/N : THB0648BE-AB31</b>	
<b>Equipment: 1.Oven: E24-T0161</b>	<b>On/Off Cycles: Every 500 hours</b>

◎ **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 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	3,478	6,360.0	896,089	128,013

**Test Progress:**

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2011/12/7 9:00 AM	2012/8/2 4:46 AM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	<b>6360.0</b>

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	2,534,521	362,074
30	16.00	1,792,177	256,025
40	8.00	896,089	128,013
50	4.00	448,044	64,006
60	2.00	224,022	32,003
70	1.00	112,011	16,002

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
DG11FNL161	2254.00	2012/12/3	Chaoping.Duan	Susana.Chen



## DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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 THB 60x60x38 mm series as the right table				THB0648BE					
<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>				
3,478	2011/12/7 9:00 AM	2012/8/2 4:46 AM	56	0	<b>6360.0</b>				
Representative Test P/N : THB0648BE-AB31			<b>Current Test Status</b>	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination			
Equipment: 1.Oven: E24-T0161				On/Off Cycles: Every 500 hours					
<b>Test Data Between Initial Test and Final Test</b>									
Sample No.	Initial Test Current Spec. (mA) <b>410 Max.</b>	Final Test Current Spec. (mA) <b>410 Max.</b>	Deviation (%)	Initial Test Speed Spec. (RPM) <b>10800-13200</b>	Final Test Speed Spec. (RPM) <b>10800-13200</b>	Deviation (%)	Initial Test Noise Spec. (dB A) <b>65.5 Max</b>	Final Test Noise Spec. (dB A) <b>65.5 Max</b>	Deviation <b>3 dBMax.</b>
1	320	314	-1.9	12070	11932	-1.1	60.4	62.2	1.8
2	317	310	-2.2	11954	12041	0.7	60.7	62.4	1.7
3	337	316	-6.2	12013	11941	-0.6	60.5	62.8	2.3
4	329	315	-4.3	12009	11873	-1.1	60.6	62.5	1.9
5	323	314	-2.8	11976	12022	0.4	60.4	62.3	1.9
6	322	311	-3.4	12059	11977	-0.7	60.8	62.7	1.9
7	324	316	-2.5	11923	11875	-0.4	60.7	62.4	1.7
8	318	317	-0.3	11897	11938	0.3	60.9	62.6	1.7
9	323	319	-1.2	11964	11976	0.1	60.5	62.7	2.2
10	340	317	-6.8	12073	11880	-1.6	60.4	62.4	2.0
11	319	318	-0.3	12025	11899	-1.0	60.7	62.8	2.1
12	326	314	-3.7	12028	11991	-0.3	60.5	62.3	1.8
13	319	314	-1.6	11971	11896	-0.6	60.4	62.7	2.3
14	318	318	0.0	11983	11950	-0.3	60.7	62.4	1.7
15	321	313	-2.5	11994	11922	-0.6	60.5	62.6	2.1
16	329	317	-3.6	11961	11966	0.0	60.3	62.3	2.0
17	324	311	-4.0	12023	11874	-1.2	60.7	62.5	1.8
18	323	317	-1.9	12040	11954	-0.7	60.5	62.8	2.3
19	321	312	-2.8	11957	11963	0.1	60.4	62.4	2.0
20	322	316	-1.9	12047	11951	-0.8	60.7	62.6	1.9
21	322	314	-2.5	12065	11984	-0.7	60.5	62.3	1.8
22	321	312	-2.8	11908	11935	0.2	60.4	62.5	2.1
23	338	313	-7.4	11955	11999	0.4	60.3	62.2	1.9
24	325	318	-2.2	12004	11986	-0.1	60.2	62.8	2.6
25	325	317	-2.5	12010	12065	0.5	60.7	62.4	1.7
26	329	313	-4.9	11891	12022	1.1	60.5	62.6	2.1
27	327	315	-3.7	11964	12057	0.8	60.4	62.8	2.4
28	326	312	-4.3	12037	12011	-0.2	60.3	62.7	2.4
29	314	311	-1.0	11949	12090	1.2	60.2	62.4	2.2
30	323	314	-2.8	12009	12047	0.3	60.5	62.7	2.2
31	320	316	-1.3	12039	12063	0.2	60.7	62.4	1.7
32	328	315	-4.0	11999	12037	0.3	60.4	62.3	1.9
<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>		
DG11FNL161	2254.00		2012/12/3		Chaoping.Duan		Susana.Chen		



## DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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3,478	2011/12/7 9:00 AM	2012/8/2 4:46 AM	56	0	<b>6360.0</b>					
Representative Test P/N : THB0648BE-AB31				<b>Current Test Status</b>		<input type="checkbox"/> In process		<input type="checkbox"/> In process (exceed requested)		<input checked="" type="checkbox"/> Termination
Equipment: 1.Oven: E24-T0161						On/Off Cycles: Every 500 hours				
<b>Test Data Between Initial Test and Final Test</b>										
Sample No.	Initial Test Current Spec. (mA) <b>410 Max.</b>	Final Test Current Spec. (mA) <b>410 Max.</b>	Deviation (%)	Initial Test Speed Spec. (RPM) <b>10800-13200</b>	Final Test Speed Spec. (RPM) <b>10800-13200</b>	Deviation (%)	Initial Test Noise Spec. (dB A) <b>65.5 Max</b>	Final Test Noise Spec. (dB A) <b>65.5 Max</b>	Deviation <b>3 dBMax.</b>	
33	327	317	-3.1	11965	12015	0.4	60.3	62.7	2.4	
34	323	316	-2.2	12077	12032	-0.4	60.5	62.3	1.8	
35	320	320	0.0	11860	12013	1.3	60.7	62.8	2.1	
36	322	314	-2.5	11993	12021	0.2	60.4	62.4	2.0	
37	317	317	0.0	11885	11988	0.9	60.5	62.8	2.3	
38	328	311	-5.2	11858	12058	1.7	60.7	62.6	1.9	
39	315	310	-1.6	11938	11972	0.3	60.9	62.3	1.4	
40	326	317	-2.8	12028	12026	0.0	60.4	62.7	2.3	
41	318	314	-1.3	11941	11965	0.2	60.5	62.6	2.1	
42	329	317	-3.6	11995	11880	-1.0	60.6	62.3	1.7	
43	324	314	-3.1	12028	12028	0.0	60.7	62.5	1.8	
44	328	320	-2.4	11921	11869	-0.4	60.4	62.8	2.4	
45	336	315	-6.3	11910	11995	0.7	60.5	62.2	1.7	
46	329	322	-2.1	11918	11840	-0.7	60.7	62.4	1.7	
47	317	307	-3.2	11993	12030	0.3	60.8	62.6	1.8	
48	335	313	-6.6	12022	11981	-0.3	60.6	62.3	1.7	
49	323	311	-3.7	11971	12101	1.1	60.4	62.7	2.3	
50	335	312	-6.9	12005	12012	0.1	60.5	62.5	2.0	
51	322	316	-1.9	12069	12049	-0.2	60.7	62.4	1.7	
52	322	315	-2.2	11979	12005	0.2	60.9	62.2	1.3	
53	330	316	-4.2	11881	12027	1.2	60.4	62.8	2.4	
54	341	314	-7.9	11985	12014	0.2	60.7	62.5	1.8	
55	323	311	-3.7	11959	12028	0.6	60.5	62.7	2.2	
56	330	315	-4.5	12049	12124	0.6	60.9	62.3	1.4	
X-Bar	324.9	314.7	-	11982.6	11985.5	-	60.55	62.52	-	
$\sigma$	6.212	2.866	-	56.679	64.357	-	0.179	0.195	-	
<b>QE File No.</b>		<b>Time-out for function test or others (hrs)</b>		<b>Issued Date</b>		<b>Reported By</b>		<b>Approved By</b>		
DG11FNL161		2254.00		2012/12/3		Chaoping.Duan		Susana.Chen		