



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 140x140x38.0 mm series as the right table	THB1448AE				

Representative Test P/N : THB1448AE-SM00

Equipment: 1.Oven: E24-T0167 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	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)
2011/10/31 9:00 AM	2012/7/24 4:16 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" 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 :
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
DG11FNL137	2937.50	2012/12/5	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 140x140x38.0 mm series as the right table				THB1448AE					
Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)				
3,478	2011/10/31 9:00 AM	2012/7/24 4:16 PM	56	0	6478.0				
Representative Test P/N : THB1448AE-SM00			Current Test Status	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination			
Equipment: 1.Oven: E24-T0167				On/Off Cycles: Every 500 hours					
Test Data Between Initial Test and Final Test									
Sample No.	Initial Test Current Spec. (A) 1.32 Max.	Final Test Current Spec. (A) 1.32 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 5490-6710	Final Test Speed Spec. (RPM) 5490-6710	Deviation (%)	Initial Test Noise Spec. (dB A) 69.8 Max	Final Test Noise Spec. (dB A) 69.8 Max	Deviation 3 dBMax.
1	1.11	1.10	-0.8	5936	6107	2.9	66.0	66.4	0.4
2	1.09	1.06	-3.1	5948	6140	3.2	66.2	66.2	0.0
3	1.12	1.09	-2.9	6171	6078	-1.5	66.4	66.7	0.3
4	1.07	1.07	-0.3	6103	6047	-0.9	66.1	66.9	0.8
5	1.05	1.09	4.2	5912	6077	2.8	65.9	66.5	0.6
6	1.07	1.07	-0.1	5978	5799	-3.0	66.3	66.8	0.5
7	1.06	1.10	3.7	5978	6116	2.3	66.2	66.2	0.0
8	1.13	1.11	-2.1	6220	6096	-2.0	65.8	66.8	1.0
9	1.08	1.14	6.0	6063	6176	1.9	66.4	67.0	0.6
10	1.13	0.99	-12.4	6147	5636	-8.3	66.1	66.4	0.3
11	1.07	1.06	-1.2	6099	6090	-0.1	66.5	66.7	0.2
12	1.06	1.09	2.2	6068	6057	-0.2	66.3	66.1	-0.2
13	1.01	1.02	1.4	5881	5915	0.6	66.1	66.2	0.1
14	1.07	1.03	-3.6	6080	5925	-2.5	65.7	66.5	0.8
15	1.07	1.05	-1.7	6016	6059	0.7	66.3	66.8	0.5
16	1.06	1.08	1.9	6094	6122	0.5	66.2	66.3	0.1
17	1.11	1.04	-6.6	6149	6114	-0.6	65.6	66.8	1.2
18	1.04	1.06	2.3	6033	6029	-0.1	66.3	66.5	0.2
19	1.12	1.05	-6.3	6109	6025	-1.4	66.2	66.1	-0.1
20	1.10	1.05	-4.4	6083	6107	0.4	65.7	66.9	1.2
21	1.07	1.07	-0.8	6095	5962	-2.2	66.3	66.4	0.1
22	1.02	1.08	5.5	5938	6137	3.4	66.2	66.5	0.3
23	0.99	1.09	10.5	5986	6069	1.4	66.1	67.0	0.9
24	1.02	0.89	-12.5	5948	6425	8.0	66.3	66.2	-0.1
25	1.08	1.10	1.5	6119	6076	-0.7	66.0	66.8	0.8
26	1.04	1.10	5.8	6026	6091	1.1	66.2	66.1	-0.1
27	1.08	1.07	-1.4	6081	6006	-1.2	66.4	66.7	0.3
28	1.08	1.14	5.3	6067	6256	3.1	65.8	66.5	0.7
29	1.06	0.95	-10.4	6092	6012	-1.3	65.9	66.6	0.7
30	1.04	1.14	10.3	6061	6124	1.0	66.2	66.2	0.0
31	1.02	1.06	3.7	6026	6102	1.3	66.4	66.8	0.4
32	1.07	1.12	4.9	6133	6129	-0.1	66.2	66.1	-0.1
QE File No.	Time-out for function test or others (hours)			Issued Date		Reported By		Approved By	
DG11FNL137	2937.50			2012/12/5		Chaoping.Duan		Susana.Chen	



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

Available for these models with lower speed and same physical structure.
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applies to THB 140x140x38.0 mm series as the right table

THB1448AE				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2011/10/31 9:00 AM	2012/7/24 4:16 PM	56	0	6478.0

Representative Test P/N : THB1448AE-SM00	Current Test Status	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination

Equipment: 1.Oven: E24-T0167 On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) 1.32 Max.	Final Test Current Spec. (A) 1.32 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 5490-6710	Final Test Speed Spec. (RPM) 5490-6710	Deviation (%)	Initial Test Noise Spec. (dB A) 69.8 Max	Final Test Noise Spec. (dB A) 69.8 Max	Deviation 3 dBMax.
33	1.03	1.09	6.2	6020	6155	2.2	66.5	66.4	-0.1
34	1.08	1.04	-3.1	6059	5861	-3.3	66.0	66.9	0.9
35	1.06	1.08	1.7	6046	5955	-1.5	66.1	66.3	0.2
36	1.06	1.06	-0.1	6062	6044	-0.3	66.3	66.5	0.2
37	1.04	1.07	3.0	5983	5987	0.1	66.2	67.0	0.8
38	1.09	1.12	2.5	6108	6171	1.0	66.3	66.8	0.5
39	1.08	1.11	2.6	6123	6121	0.0	66.5	66.1	-0.4
40	1.03	1.08	5.1	6036	6063	0.4	65.7	66.6	0.9
41	1.03	1.06	2.8	5945	5952	0.1	65.9	66.3	0.4
42	1.02	1.06	3.4	6030	5836	-3.2	65.8	66.9	1.1
43	1.06	1.05	-1.8	6036	6103	1.1	66.2	66.5	0.3
44	1.09	1.11	1.8	6082	6103	0.3	65.7	66.2	0.5
45	1.07	1.07	0.2	6012	6118	1.8	65.9	66.7	0.8
46	1.05	1.04	-0.9	6059	6204	2.4	66.2	66.3	0.1
47	1.05	1.08	2.4	6028	6043	0.2	66.3	66.9	0.6
48	1.03	1.07	4.2	6034	6034	0.0	66.5	66.2	-0.3
49	1.03	1.04	1.1	5972	6052	1.3	65.9	66.6	0.7
50	1.08	1.09	0.7	6102	6082	-0.3	65.7	66.8	1.1
51	1.06	1.06	0.0	6016	6108	1.5	65.9	66.5	0.6
52	1.07	1.17	9.0	6083	6186	1.7	66.3	66.7	0.4
53	1.12	1.11	-0.7	6116	6135	0.3	66.1	66.1	0.0
54	1.03	1.10	6.9	6025	5998	-0.4	66.2	66.4	0.2
55	1.07	1.10	3.0	6089	6136	0.8	66.5	66.8	0.3
56	1.03	1.08	5.0	6045	6133	1.5	66.4	66.5	0.1
X-Bar	1.063	1.073	-	6049.1	6065.8	-	66.13	66.53	-
σ	0.032	0.044	-	67.505	116.003	-	0.245	0.281	-

QE File No.	Time-out for function test or others (hrs)	Issued Date	Reported By	Approved By
DG11FNL137	2937.50	2012/12/5	Chaoping.Duan	Susana.Chen