

DC FAN LIFE EXPERIMENT REPORT

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 170x150x50.8 mm series as the right table	THB1548DG-CA01				
	THB1548DG-CXKQ				

Representative Test P/N : THB1548DG-CA02

Equipment: 1.Oven: E24-T0178

On/Off Cycles: Every 500 hours

◎ L_{10} Expectancy: 70,000 hours minimum @ fan rated voltage and the temperature of 40°C

According to the equation for Weibull distribution, $MTTF \cong 7 \times L_{10} = 490,000$ 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,

$$t = 1.036 \times MTTF \times [(B_{r;c}) \div n]^{0.91} \div A_F, \text{ and } A_F = 2^{(T_s - T_u)/10}$$

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)
60	40	4.00	56	2.303	6,956	9,956.0	701,373	100,196

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2014/7/10 9:30 AM	2016/8/13 2:03 PM	☐ In process	☒ In process (exceed requested)	☐ Termination	9956.0

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_{10} 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	11.31	1,983,781	283,397
30	8.00	1,402,745	200,392
40	4.00	701,373	100,196
50	2.00	350,686	50,098
60	1.00	175,343	25,049
70	0.50	87,672	12,525
75	0.35	61,993	8,856

Fan permission criteria for the measurement after test :

1. Speed can not drop of $\geq 15\%$ below the original measured rpm.
2. Current cannot increase $> 15\%$ of original measure current.
3. Noise cannot $> 3\text{dB}$ over the original measure noise.

Test Result

☒ Accept
☐ Reject

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG14FNL078	0.00	2017/3/28	Dongqian.Liang	Tim.Yi

BGN (dBA) : 16.2

Temp (°C) : 24.5



DC FAN FUNCTION TEST RECORD

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				THB1548DG-CXKQ					
Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)				
6,956	2014/7/10 9:30 AM	2016/8/13 2:03 PM	56	0	9956.0				
Representative Test P/N : THB1548DG-CA02			Current Test Status	☐ In process	☒ In process (exceed requested)	☐ Termination			
Equipment: 1.Oven: E24-T0178				On/Off Cycles: Every 500 hours					
Test Data Between Initial Test and Final Test									
Sample No.	Initial Test Current Spec. (A) 3.6Max.	Final Test Current Spec. (A) 3.6Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 5220-6380	Final Test Speed Spec. (RPM) 5220-6380	Deviation (%)	Initial Test Noise Spec. (dB A) 74.0 Max	Final Test Noise Spec. (dB A) 74.0 Max	Deviation 3 dBMax.
1	1.45	1.42	-2.0	5781	5895	2.0	69.9	71.5	1.6
2	1.43	1.48	3.7	5945	5897	-0.8	69.9	71.4	1.5
3	1.44	1.41	-2.2	5743	5893	2.6	70.1	72.1	2.0
4	1.37	1.40	1.7	5791	5821	0.5	69.8	71.6	1.8
5	1.42	1.42	-0.6	5797	5867	1.2	69.7	71.5	1.8
6	1.40	1.41	0.8	5864	5916	0.9	70.2	71.7	1.5
7	1.46	1.43	-1.8	5777	5875	1.7	69.5	71.8	2.3
8	1.38	1.41	2.1	5904	5911	0.1	70.5	71.5	1.0
9	1.41	1.37	-2.6	5721	5874	2.7	69.7	72.1	2.4
10	1.33	1.36	1.9	5778	5779	0.0	70.2	71.9	1.7
11	1.46	1.44	-1.0	5826	5903	1.3	69.5	71.5	2.0
12	1.40	1.41	1.1	5875	5887	0.2	70.5	71.7	1.2
13	1.45	1.45	-0.1	5853	5927	1.3	69.7	71.7	2.0
14	1.39	1.42	2.5	5897	5889	-0.1	70.1	71.2	1.1
15	1.44	1.40	-2.8	5877	5857	-0.3	69.9	71.6	1.7
16	1.39	1.39	0.1	5807	5842	0.6	70.3	72.2	1.9
17	1.41	1.41	-0.4	5866	5902	0.6	70.5	71.4	0.9
18	1.41	1.41	0.1	5870	5934	1.1	69.7	71.8	2.1
19	1.44	1.42	-1.2	5835	5918	1.4	70.0	72.0	2.0
20	1.42	1.45	2.1	5874	5876	0.0	70.2	72.1	1.9
21	1.43	1.34	-5.9	5919	5804	-1.9	70.4	71.9	1.5
22	1.37	1.44	5.0	5819	5904	1.5	69.5	72.4	2.9
23	1.46	1.42	-2.8	5849	5855	0.1	69.7	71.9	2.2
24	1.36	1.40	2.9	5851	5944	1.6	69.9	71.9	2.0
25	1.42	1.43	1.1	5874	5939	1.1	70.1	71.9	1.8
26	1.40	1.40	0.1	5832	5824	-0.1	70.3	71.2	0.9
27	1.39	1.41	2.0	5808	5847	0.7	69.5	72.0	2.5
28	1.36	1.45	6.0	5795	5880	1.5	70.5	72.2	1.7
29	1.39	1.40	1.2	5823	5809	-0.2	69.8	71.7	1.9
30	1.40	1.38	-1.4	5761	5828	1.2	70.0	71.8	1.8
31	1.35	1.39	2.4	5814	5895	1.4	70.2	72.4	2.2
32	1.37	1.38	0.4	5766	5842	1.3	69.7	71.9	2.2
QE File No.	Time-out for function test or others (hours)		Issued Date	Reported By		Approved By			
DG14FNL078	0.00		2017/3/28	Dongqian.Liang		Tim.Yi			



DC FAN FUNCTION TEST RECORD

FOR LIFE EXPERIMENT

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				THB1548DG-CXKQ					
Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)				
6,956	2014/7/10 9:30 AM	2016/8/13 2:03 PM	56	0	9956.0				
Representative Test P/N : THB1548DG-CA02			Current Test Status	☐ In process	☒ In process (exceed requested)	☐ Termination			
Equipment: 1.Oven: E24-T0178				On/Off Cycles: Every 500 hours					
Test Data Between Initial Test and Final Test									
Sample No.	Initial Test Current Spec. (A) 3.6Max.	Final Test Current Spec. (A) 3.6Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 6380-5220	Final Test Speed Spec. (RPM) 6380-5220	Deviation (%)	Initial Test Noise Spec. (dB A) 74.0 Max	Final Test Noise Spec. (dB A) 74.0 Max	Deviation 3 dBMax.
33	1.36	1.37	0.8	5825	5844	0.3	69.6	71.3	1.7
34	1.38	1.39	1.0	5727	5751	0.4	70.0	72.2	2.2
35	1.37	1.38	0.5	5839	5852	0.2	69.5	72.1	2.6
36	1.40	1.34	-4.3	5846	5842	-0.1	69.8	72.5	2.7
37	1.41	1.39	-0.9	5871	5858	-0.2	70.1	72.3	2.2
38	1.40	1.38	-1.6	5808	5916	1.9	70.4	72.2	1.8
39	1.37	1.41	2.5	5777	5920	2.5	69.6	71.8	2.2
40	1.41	1.40	-0.6	5790	5839	0.8	69.8	71.9	2.1
41	1.35	1.39	3.3	5766	5820	0.9	70.0	71.2	1.2
42	1.40	1.40	0.1	5809	5856	0.8	70.2	71.8	1.6
43	1.40	1.34	-4.4	5828	5859	0.5	69.5	69.5	0.0
44	1.42	1.41	-1.0	5842	5827	-0.3	70.4	71.7	1.3
45	1.36	1.41	3.6	5772	5879	1.9	69.6	72.0	2.4
46	1.35	1.41	4.2	5761	5901	2.4	69.8	71.8	2.0
47	1.38	1.36	-2.0	5791	5848	1.0	70.1	71.7	1.6
48	1.38	1.35	-2.3	5790	5787	-0.1	69.9	71.9	2.0
49	1.44	1.40	-2.8	5825	5823	0.0	70.3	71.3	1.0
50	1.37	1.39	1.3	5823	5850	0.5	69.6	72.0	2.4
51	1.41	1.42	0.7	5765	5832	1.2	70.5	72.5	2.0
52	1.40	1.37	-2.4	5893	5876	-0.3	69.8	71.9	2.1
53	1.41	1.37	-3.5	5842	5848	0.1	70.0	72.1	2.1
54	1.35	1.43	5.5	5752	5895	2.5	69.6	71.9	2.3
55	1.41	1.44	1.8	5808	5843	0.6	70.4	71.8	1.4
56	1.38	1.40	1.4	5777	5880	1.8	69.7	71.5	1.8
X-Bar	1.4	1.4	-	5820.0	5865.7	-	69.96	71.79	-
σ	0.031	0.029	-	48.950	41.598	-	0.317	0.449	-
QE File No.	Time-out for function test or others (hrs)		Issued Date		Reported By		Approved By		
DG14FNL078	0.00		2017/3/28		Dongqian.Liang		Tim.Yi		