

DC FAN CUSTOMIZED 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 THB80x80x38mm series as the right table

THB0812BEA03	THB0812BEAGU	THB0848BEA04		
THB0812BEA02	THB0812BEA4Z	THB0848BEAB6		
THB0812BEA09	THB0848BEAQE	THB0848BEB51		
THB0812BEAGT	THB0848BEA5Y			

Representative Test P/N : THB0812BEA07

Equipment: 1.Oven: E24-T0179

On/Off Cycles: Every 500 hours

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

According to the equation for **Weibull distribution**,

$$MTTF \approx 1.89 \times L_{10} = 132,300 \text{ hours}$$

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,

$$t = 1.119 \times MTTF \times [(B_{r;c}) \div n]^{0.33} \div A_F, \text{ and } A_F = 1.5^{(T_s - T_u)/10}$$

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	3.38	56	2.303	15,303	5,478.0	47,360	25,058

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2014/8/11 10:00 AM	2016/9/2 10:48 PM	☐ In process	☐ In process (exceed requested)	☒ Termination	5478.0

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.)

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 Method according to IPC-9591.

Temperature for MTTF Estimation (°C)	Acceleration Factor A_F	Estimated MTTF (hours)	Estimated L_{10} (hours)
25	6.20	87,006	46,035
30	5.06	71,040	37,587
40	3.38	47,360	25,058
50	2.25	31,573	16,705
60	1.50	21,049	11,137
70	1.00	14,033	7,425

Test Result

☒ Accept
☐ Reject

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG14FNL102	2782.00	2015/8/6	NaNa.Wang	Tim.Yi

BGN (dBA) :16.1

Temp (°C) : 24.4



DC FAN FUNCTION TEST RECORD FOR CUSTOMIZED LIFE EXPERIMENT

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THB0812BEAGT	THB0848BEA5Y			

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
15,303	2014/8/11 10:00 AM	2016/9/2 10:48 PM	56	0	5478.0

Representative Test P/N : THB0812BEA07	Current Test Status	☐ In process	☐ In process (exceed requested)	☒ Termination
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Equipment: 1.Oven: E24-T0179	On/Off Cycles: Every 500 hours
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Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) 3.48 Max	Final Test Current Spec. (A) 3.48 Max	Deviation (%)	Initial Test Speed Spec. (RPM) 13500-16500	Final Test Speed Spec. (RPM) 13500-16500	Deviation (%)	Initial Test Noise Spec. (dB A) 74.0 Max	Final Test Noise Check. (dB A) 74.0 Max	Deviation 3 dB Max
1	2.75	2.68	-2.5	14979	14937	-0.3	67.9	68.3	0.4
2	2.80	2.62	-6.3	15007	14997	-0.1	69.0	67.3	-1.7
3	2.90	2.59	-10.7	15010	14907	-0.7	69.4	68.6	-0.8
4	2.88	2.68	-6.9	14999	15037	0.3	69.2	68.4	-0.8
5	2.81	2.61	-7.1	15000	14932	-0.5	69.3	68.9	-0.4
6	2.74	2.63	-4.0	14987	15021	0.2	67.4	69.0	1.6
7	2.83	2.64	-6.7	14978	14963	-0.1	69.5	68.5	-1.0
8	2.85	2.65	-7.0	15020	15033	0.1	68.4	68.7	0.3
9	2.77	2.84	2.5	15018	14949	-0.5	68.6	67.9	-0.7
10	2.80	2.60	-7.3	15029	15008	-0.1	69.3	67.3	-2.0
11	2.79	2.64	-5.3	15028	14972	-0.4	68.8	67.5	-1.3
12	2.88	2.49	-13.7	14979	14900	-0.5	67.8	68.0	0.2
13	2.80	2.70	-3.6	15005	14859	-1.0	68.0	68.0	0.0
14	2.83	2.62	-7.3	15021	14996	-0.2	68.2	67.8	-0.4
15	2.85	2.66	-6.7	15012	15007	0.0	69.1	68.4	-0.7
16	2.90	2.63	-9.3	14994	15046	0.3	68.4	68.6	0.2
17	2.85	2.47	-13.5	15046	15005	-0.3	68.6	68.8	0.2
18	2.90	2.50	-13.8	14965	14940	-0.2	69.3	69.0	-0.3
19	2.79	2.62	-6.3	15037	15025	-0.1	68.7	68.1	-0.6
20	2.97	2.67	-10.1	15006	14983	-0.2	69.5	67.4	-2.1
21	2.89	2.69	-6.9	15013	15148	0.9	68.9	68.2	-0.7
22	2.89	2.67	-7.5	15007	15033	0.2	68.0	67.6	-0.4
23	2.90	2.47	-14.6	14992	15096	0.7	68.2	68.4	0.2
24	2.75	2.63	-4.3	14990	14924	-0.4	68.4	68.6	0.2
25	2.80	2.68	-4.4	14984	14994	0.1	69.1	67.8	-1.3
26	2.84	2.68	-5.3	14963	14938	-0.2	68.7	68.9	0.2
27	2.92	2.62	-10.5	15038	14985	-0.4	69.3	68.3	-1.0
28	2.80	2.61	-6.6	15014	14923	-0.6	68.8	67.4	-1.4
29	2.95	2.64	-10.3	15029	15007	-0.1	68.0	68.0	0.0
30	2.74	2.61	-4.9	14999	15025	0.2	68.2	68.2	0.0
31	2.94	2.67	-9.4	14988	14926	-0.4	69.1	67.5	-1.6
32	2.78	2.61	-6.3	14997	15041	0.3	69.3	67.7	-1.6

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG14FNL102	2782.00	2015/8/6	NaNa.Wang	Tim.Yi



DC FAN FUNCTION TEST RECORD

FOR CUSTOMIZED LIFE EXPERIMENT

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Representative Test P/N : THB0812BEA07	Current Test Status	☐ In process	☐ In process (exceed requested)	☒ Termination
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33	2.86	2.56	-10.3	14980	14985	0.0	68.1	68.1	0.0
34	2.89	2.67	-7.8	15006	14985	-0.1	68.3	68.6	0.3
35	2.79	2.72	-2.6	15049	15042	0.0	68.5	67.8	-0.7
36	2.90	2.62	-9.9	14990	15038	0.3	69.2	68.8	-0.4
37	2.89	2.50	-13.3	15000	14933	-0.4	68.7	67.4	-1.3
38	2.83	2.54	-10.3	14995	14898	-0.6	69.4	67.6	-1.8
39	2.74	2.57	-5.9	14970	15081	0.7	68.9	68.1	-0.8
40	2.86	2.60	-9.2	14973	14879	-0.6	67.9	67.7	-0.2
41	2.87	2.51	-12.4	15005	15058	0.4	68.1	68.3	0.2
42	2.86	2.65	-7.2	15015	15078	0.4	68.3	68.5	0.2
43	2.84	2.54	-10.6	15023	14986	-0.2	69.0	67.9	-1.1
44	2.77	2.67	-3.6	14999	14931	-0.5	68.5	68.7	0.2
45	2.81	2.58	-8.3	14986	15003	0.1	69.2	68.9	-0.3
46	2.81	2.74	-2.6	15023	14973	-0.3	69.4	67.3	-2.1
47	2.90	2.53	-12.9	15032	14940	-0.6	68.8	68.0	-0.8
48	2.74	2.63	-3.9	15010	14917	-0.6	67.9	67.5	-0.4
49	2.86	2.58	-9.8	14980	14953	-0.2	68.1	68.3	0.2
50	2.89	2.65	-8.4	15006	14965	-0.3	68.3	68.5	0.2
51	2.80	2.53	-9.4	15008	14929	-0.5	68.5	67.7	-0.8
52	2.80	2.71	-3.2	15043	14895	-1.0	69.0	67.9	-1.1
53	2.79	2.52	-9.7	15049	15049	0.0	68.6	68.8	0.2
54	2.90	2.62	-9.8	14990	14981	-0.1	69.2	69.0	-0.2
55	2.80	2.62	-6.2	15002	15026	0.2	69.4	68.6	-0.8
56	2.76	2.48	-10.3	15023	14975	-0.3	68.9	68.0	-0.9
X-Bar	2.84	2.61	-	15005.196	14983.16	-	68.689	68.16	-
σ	0.059	0.073	-	21.388	58.851	-	0.532	0.511	-

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DG14FNL102	2782.00	2015/8/6	NaNa.Wang	Tim.Yi