

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 toTHB Φ 220*53mm series as the right table					
Representative Test P/N : THB2048HG-01CYZ					
Equipment: 1.Oven: E24-T0161				On/Off Cycles: Every 500 hours	

◎ **L₁₀ Expectancy:** **70,000** hours minimum @ fan rated voltage and the temperature of 40℃
According to the equation for **Weibull distribution**, $MTTF \approx 7 \times L_{10} = 490,000$ 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)
75	40	11.31	25	2.303	5,123	6,476.0	619,427	88,490

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2018/12/14 9:00 AM	2019/8/23 11:39 PM	<input type="checkbox"/> In process	<input checked="" type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination	6476.0

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	32.00	1,752,004	250,286
30	22.63	1,238,854	176,979
40	11.31	619,427	88,490
50	5.66	309,713	44,245
60	2.83	154,857	22,122
70	1.41	77,428	11,061
75	1.00	54,750	7,821

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
DG18FNL114	7099.00	2020/7/2	Loly.Wang	Tim.Yi

BGN (dBA) : 16.0

Temp (°C) : 25.0



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)				
5,123	2018/12/14 9:00 AM	2019/8/23 11:39 PM	25	0	6476.0				
Representative Test P/N : THB2048HG-01CYZ			Current Test Status	<input type="checkbox"/> In process	<input checked="" type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination			
Equipment: 1.Oven: E24-T0161				On/Off Cycles: Every 500 hours					
Test Data Between Initial Test and Final Test									
Sample No.	Initial Test Current Spec. (A) 4.70 Max.	Final Test Current Spec. (A) 4.70 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 5760-7040	Final Test Speed Spec. (RPM) 5760-7040	Deviation (%)	Initial Test Noise Spec. (dB A) 79.5 Max	Final Test Noise Spec. (dB A) 79.5 Max	Deviation 3 dBMax.
1	4.45	3.84	-13.6	6471	6430	-0.6	77.3	75.1	-2.2
2	4.50	3.72	-17.3	6473	6394	-1.2	76.7	75.4	-1.3
3	4.44	3.87	-12.9	6423	6451	0.4	77.0	76.0	-1.0
4	4.60	3.88	-15.6	6457	6419	-0.6	76.7	75.8	-0.9
5	4.44	3.61	-18.7	6472	6433	-0.6	77.3	75.3	-2.0
6	4.40	3.66	-16.9	6440	6475	0.5	77.1	75.9	-1.2
7	4.57	3.84	-15.9	6462	6439	-0.4	77.0	75.6	-1.4
8	4.51	3.62	-19.8	6456	6418	-0.6	76.5	75.8	-0.7
9	4.52	3.73	-17.5	6471	6480	0.1	76.6	75.4	-1.2
10	4.43	3.84	-13.2	6454	6387	-1.0	77.2	75.3	-1.9
11	4.45	3.71	-16.6	6461	6459	0.0	76.7	75.4	-1.3
12	4.41	3.67	-16.9	6477	6456	-0.3	77.1	76.1	-1.0
13	4.41	3.80	-13.7	6436	6411	-0.4	76.9	75.5	-1.4
14	4.54	3.80	-16.4	6482	6423	-0.9	76.8	75.9	-0.9
15	4.54	3.82	-15.9	6477	6426	-0.8	77.0	75.6	-1.4
16	4.46	3.87	-13.1	6488	6412	-1.2	76.4	75.5	-0.9
17	4.43	3.75	-15.4	6462	6474	0.2	74.7	75.6	0.9
18	4.51	3.74	-17.2	6428	6393	-0.5	77.6	75.8	-1.8
19	4.14	3.87	-6.4	6481	6464	-0.3	76.8	75.2	-1.6
20	4.37	3.81	-12.9	6478	6416	-1.0	74.7	75.8	1.1
21	4.44	3.76	-15.3	6445	6473	0.4	75.2	76.2	1.0
22	4.12	3.62	-12.1	6455	6420	-0.5	75.2	75.3	0.1
23	4.43	3.86	-12.9	6412	6452	0.6	75.4	75.5	0.1
24	4.46	3.81	-14.5	6452	6432	-0.3	76.7	75.1	-1.6
25	4.33	3.74	-13.7	6455	6453	0.0	76.5	75.3	-1.2
X-Bar	4.44	3.77	-	6458.72	6435.60	-	76.52	75.58	-
σ	0.11	0.08	-	19.42	27.03	-	0.80	0.29	-
QE File No.	Time-out for function test or others (hours)		Issued Date		Reported By		Approved By		
DG18FNL114	7099.00		2020/7/2		Loly.Wang		Tim.Yi		