

SOFASCO INC.

Factory : Min Quan Electronics (Shenzhen) Co., Ltd.

DC FAN LIFE TEST REPORT

Available for these models with lower speed and same physical structure. This report applies to models as the below table.

B5015Y24B-XXX	B5015Z24B XXX	-
-	-	-
-	-	-
Y may be H or lower speed; Z may be H or lower speed		

Representative test model : B5015HH24B XXX

Prepared By : Zhang YongFang *Date :* 2008-1-10

Review By : Xiong BingHua *Date :* 2008-1-10

Approved By Guo WeiCheng *Date :* 2008-1-10

FORMULA AND PARAMETER

1. L_{10} Expectancy : 70,000 hrs. minimum @fan rated voltage and temperature of 40°C.

2. Formula According to the method of Weibull distribution, MTTF 490,000 hrs.

Base on a safety coefficient --- 1.3 times, the target time of L_{10} is 91,000 hrs.

And the target time of MTTF is 637,000 hrs.

We depend 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 equation,

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

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%).

Sample size (n) : 50 pcs.

Acceleration factor (A_F) : 16

Stress temperature (T_s) : 80 °C

Unstress temperature (T_u) : 40 °C

Poisson distribution factor ($B_{r;c}$) : 2.3026

We get required test time with zero failure = 2,506 hrs.

3. Parameter :
1. For current, the limit is less than spec. (max.).
 2. For speed, the acceptable decrease is no more than initial +15%.
 3. For noise, the limit is no more than spec. +15%.

4. Test Date :

1. Date of test start 2007-9-26 10:00
2. Date of test termination (Estimated) : 2008-1-8 20:00
3. Date of test termination (Actual) : 2008-1-9 10:00

✘ If the actual test time exceed the required, it comes out that those fans' life expectancy and MTTF are greater than warrant.

5. Test Equipments :

1. Thermostated container : D060
2. DC power supply : CPS-6060D

RESULT

1. Current Test Status :

▶ Customer Request

▶ New Product

▶ Component Change

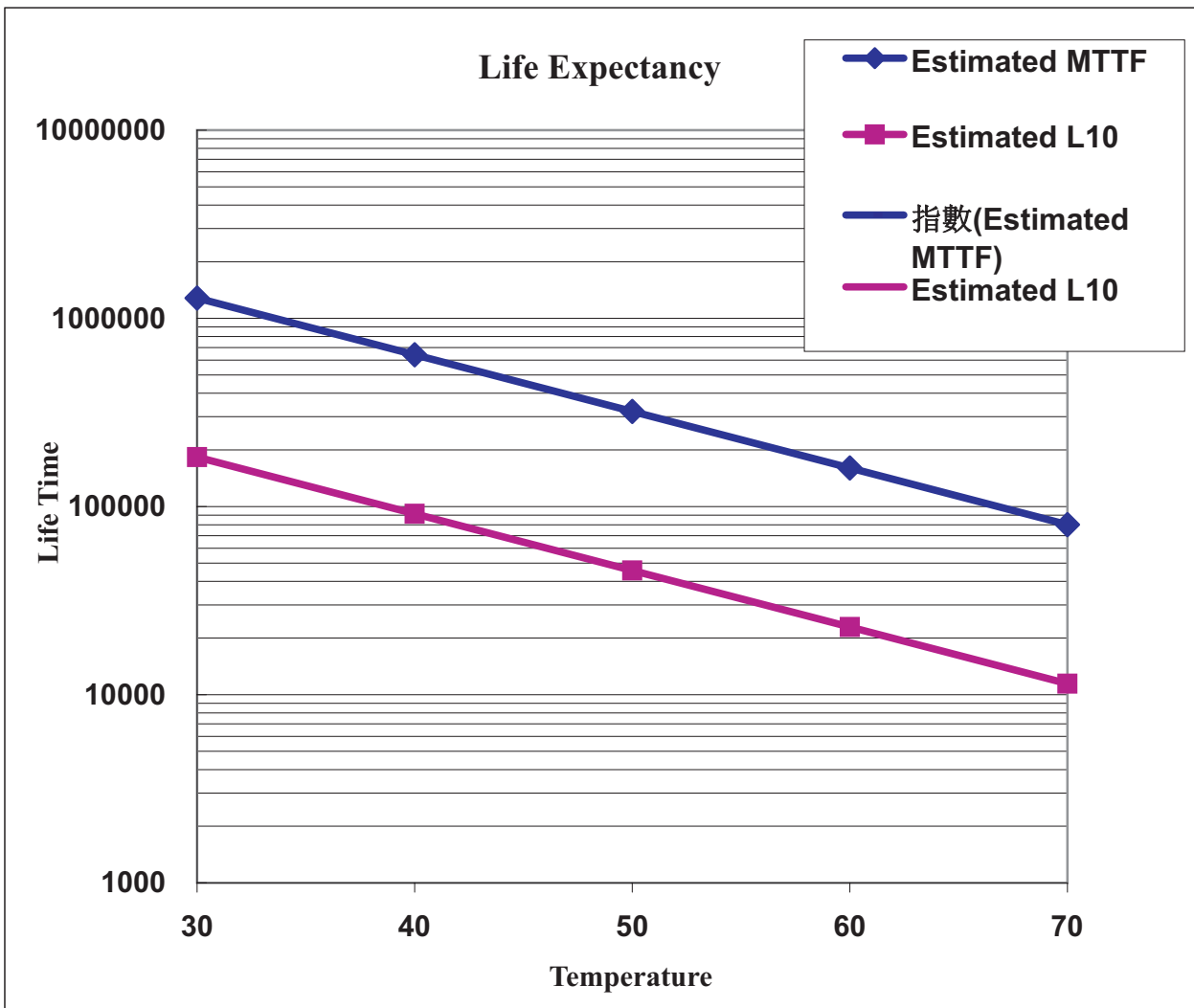
▶ Routine Test

1. Actual Test Hours : 2,520 hrs.

2. Verified MTTF : 640,626 hrs.

3. Verified L_{10} : 91,518 hrs.

Temperature Value	25	30	40	50	60	70
A_F	45.25	32	16	8	4	2
Estimated MTTF	1811964	1281252	640626	320313	160157	80079
Estimated L_{10}	258852	183036	91518	45759	22880	11440



BEFORE TEST

Sample No.	Current Spec.		Deviation	Speed Spec.		Deviation	Noise Spec.		Deviation
	0.25 Max.	0.25 Max.	%	7500 Ref.	6375 Min.	%	49.9 dBA	57.4 dBA	%
	Initial	Final		Initial	Final		Initial	Final	
1	0.14	0.14	0.0%	7448	7259	-2.5%	48.1	48.2	0.1
2	0.14	0.14	0.0%	7485	7447	-0.5%	48.8	49.4	0.6
3	0.14	0.13	-7.1%	7466	7308	-2.1%	48.8	49.0	0.2
4	0.14	0.14	0.0%	7409	7367	-0.6%	48.7	49.2	0.5
5	0.14	0.14	0.0%	7473	7380	-1.2%	48.6	49.0	0.4
6	0.14	0.14	0.0%	7442	7246	-2.6%	48.0	48.1	0.1
7	0.14	0.14	0.0%	7407	7301	-1.4%	48.4	48.8	0.4
8	0.14	0.14	0.0%	7450	7546	1.3%	47.7	48.6	0.9
9	0.14	0.13	-7.1%	7515	7566	0.7%	47.6	48.4	0.8
10	0.14	0.13	-7.1%	7455	7644	2.5%	48.5	49.7	1.2
11	0.14	0.14	0.0%	7444	7358	-1.2%	47.7	48.1	0.4
12	0.14	0.14	0.0%	7486	7401	-1.1%	48.5	48.9	0.4
13	0.14	0.14	0.0%	7390	7620	3.1%	47.4	48.7	1.3
14	0.14	0.14	0.0%	7405	7172	-3.1%	48.2	48.2	0.0
15	0.14	0.14	0.0%	7470	7706	3.2%	48.8	50.1	1.3
16	0.14	0.14	0.0%	7501	7508	0.1%	48.0	48.7	0.7
17	0.14	0.13	-7.1%	7399	7309	-1.2%	48.1	48.5	0.4
18	0.14	0.14	0.0%	7411	7367	-0.6%	48.0	48.5	0.5
19	0.13	0.13	0.0%	7406	7706	4.1%	47.5	49.0	1.5
20	0.14	0.13	-7.1%	7446	7623	2.4%	48.1	49.3	1.2
21	0.14	0.13	-7.1%	7496	7583	1.2%	47.8	48.7	0.9
22	0.14	0.14	0.0%	7389	7194	-2.6%	47.9	48.0	0.1
23	0.15	0.14	-6.7%	7424	7361	-0.8%	48.4	48.9	0.5
24	0.13	0.14	7.7%	7518	7727	2.8%	48.2	49.5	1.3
25	0.14	0.14	0.0%	7524	7192	-4.4%	48.2	47.9	-0.3
26	0.14	0.13	-7.1%	7397	7567	2.3%	48.1	49.3	1.2
27	0.14	0.13	-7.1%	7496	7315	-2.4%	47.5	47.6	0.1
28	0.15	0.14	-6.7%	7414	7246	-2.3%	48.6	48.8	0.2

BEFORE TEST

Sample No.	Current Spec.		Deviation	Speed Spec.		Deviation	Noise Spec.		Deviation
	0.25 Max.	0.25 Max.	%	7500 Ref.	6375 Min.	%	49.9 dBA	57.4 dBA	%
	Initial	Final		Initial	Final		Initial	Final	
29	0.14	0.14	0.0%	7503	7354	-2.0%	48.7	48.9	0.2
30	0.15	0.14	-6.7%	7476	7507	0.4%	47.7	48.4	0.7
31	0.14	0.13	-7.1%	7447	7704	3.5%	48.0	49.4	1.4
32	0.13	0.14	7.7%	7533	7700	2.2%	47.6	48.7	1.1
33	0.14	0.14	0.0%	7512	7566	0.7%	48.4	49.2	0.8
34	0.14	0.14	0.0%	7462	7458	-0.1%	48.0	48.6	0.6
35	0.13	0.13	0.0%	7531	7326	-2.7%	47.8	47.9	0.1
36	0.14	0.14	0.0%	7386	7381	-0.1%	47.6	48.2	0.6
37	0.14	0.14	0.0%	7423	7465	0.6%	47.6	48.4	0.8
38	0.14	0.14	0.0%	7413	7185	-3.1%	48.1	48.1	0.0
39	0.14	0.14	0.0%	7515	7577	0.8%	48.7	49.5	0.8
40	0.14	0.14	0.0%	7527	7668	1.9%	48.1	49.2	1.1
41	0.14	0.13	-7.1%	7383	7668	3.9%	48.3	49.8	1.5
42	0.14	0.14	0.0%	7431	7612	2.4%	47.8	49.0	1.2
43	0.14	0.14	0.0%	7476	7174	-4.0%	47.7	47.5	-0.2
44	0.14	0.13	-7.1%	7449	7488	0.5%	48.7	49.5	0.8
45	0.14	0.14	0.0%	7400	7657	3.5%	48.3	49.7	1.4
46	0.14	0.14	0.0%	7485	7281	-2.7%	48.5	48.6	0.1
47	0.14	0.13	-7.1%	7411	7597	2.5%	48.4	49.6	1.2
48	0.14	0.14	0.0%	7419	7355	-0.9%	48.2	48.7	0.5
49	0.14	0.14	0.0%	7432	7211	-3.0%	47.9	47.9	0.0
50	0.14	0.13	-7.1%	7471	7524	0.7%	47.8	48.6	0.8
Max.	0.15	0.14	7.7%	7533	7727	4.1%	48.8	50.1	1.5
Min.	0.13	0.13	-7.1%	7383	7172	-4.4%	47.4	47.5	-0.3
\bar{x}	0.14	0.14		7453.0	7449.5		48.1	48.8	
σ	0.004	0.005		44.7	171.0		0.40	0.60	