



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 EFB 50x50x10.0 mm series as the right table	EFB0512HA	EFB0512MA	EFB0512LA	
	EFB0505HA	EFB0505MA	EFB0505LA	
	EFB0512HHAY87			

Representative Test P/N : EFB0512HA-F00	
Equipment: 1.Oven: F00-5, E24-T057 2. DC Source: GW GPC-3060D	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)	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)
80	40	16.00	20	2.303	4,438	6,038.0	666,658	95,237

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
1999/9/8 1:00 PM	2000/3/11 12:00 AM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	6038.0

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	45.25	1,885,594	269,371
30	32.00	1,333,316	190,474
40	16.00	666,658	95,237
50	8.00	333,329	47,618
60	4.00	166,665	23,809
70	2.00	83,332	11,905
80	1.00	41,666	5,952

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	V	Accept
		Reject

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
A148L	1902.00	2000/8/4	<i>Bonnie Chung</i>	<i>Robert Sun</i>



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 EFB 50x50x10.0 mm series as the right table	EFB0512HA	EFB0512MA	EFB0512LA		
	EFB0505HA	EFB0505MA	EFB0505LA		
	EFB0512HHAY87				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
4,438	1999/9/8 1:00 PM	2000/3/11 12:00 AM	20	0	6038.0

Representative Test P/N : EFB0512HA-F00	Current Test Status	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination
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Equipment: 1.Oven: F00-5, E24-T057 2. DC Source: GW GPC-3060D On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A)	Final Test Current Spec. (A)	Deviation (%)	Initial Test Speed Spec. (RPM)	Final Test Speed Spec. (RPM)	Deviation (%)	Initial Test Noise Spec. (dB A)	Final Test Noise Spec. (dB A)	Deviation
	0.15 Max.	0.15 Max.		5500 Ref.	5500-15%		35.0 Max	38.0 Max	
1	0.09	0.09	0.0	5674	5882	3.7	32.7	34.5	1.8
2	0.10	0.09	-10.0	5680	5882	3.6	31.9	34.5	2.6
3	0.09	0.09	0.0	5556	5769	3.8	32.0	34.0	2.0
4	0.10	0.09	-10.0	5732	5882	2.6	32.7	34.5	1.8
5	0.09	0.09	0.0	5575	5769	3.5	31.5	34.1	2.6
6	0.09	0.09	0.0	5347	5607	4.9	31.6	33.4	1.8
7	0.09	0.09	0.0	5607	5825	3.9	32.0	34.2	2.2
8	0.10	0.09	-10.0	5541	5825	5.1	32.4	34.2	1.8
9	0.09	0.09	0.0	5724	5941	3.8	32.6	34.7	2.1
10	0.10	0.09	-10.0	5753	5941	3.3	32.8	34.7	1.9
11	0.09	0.09	0.0	5720	5941	3.9	32.5	34.8	2.3
12	0.09	0.09	0.0	5527	6000	8.6	32.2	35.0	2.8
13	0.10	0.09	-10.0	5518	5825	5.6	32.1	34.2	2.1
14	0.09	0.09	0.0	5563	5825	4.7	32.2	34.2	2.0
15	0.09	0.09	0.0	5569	5825	4.6	32.1	34.3	2.2
16	0.09	0.09	0.0	5758	5882	2.2	32.0	34.5	2.5
17	0.09	0.09	0.0	5564	5825	4.7	32.2	34.2	2.0
18	0.10	0.09	-10.0	5625	5825	3.6	31.9	34.4	2.5
19	0.09	0.09	0.0	5562	6000	7.9	32.4	35.0	2.6
20	0.09	0.09	0.0	5527	5769	4.4	31.4	34.0	2.6
X-Bar	0.093	0.090	-	5606.100	5852.000	-	32.159	34.370	-
σ	0.005	0.000	-	102.568	90.892	-	0.397	0.377	-

QE File No.	Time-out for function test or others (hrs)	Issued Date	Reported By	Approved By
A148L	1902.00	2000/8/4	<i>Bonnie Cheng</i>	<i>Robert Sun</i>