



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 GFB 40x50x38 mm series as the right table	GFB0412SHE			

Representative Test P/N : 8X771

Instruments used: 1. Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D On/Off Cycles: Every 500 hours

◎ **L₁₀ Expectancy: 50,000 hours minimum @ fan rated voltage and the temperature of 40°C**

According to the equation for **Weibull distribution**, **MTTF \doteq 7×L10 = 350,000 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%), and

Stress/Elevated Temperature Ts (°C)	Unstress Temperature Tu (°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 (hours)	Verified L ₁₀ (hours)
60	40	4.00	56	2.303	4,968	9,360.0	659,386	94,198

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2002/10/20 8:00 AM	2003/8/3 8:15 AM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	9360.0

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. **Basically, MTBF is equal to MTTF, they use same formula to work out a life data.**)

Fan permission criteria for the measurement after test :

1. For current, the limit is less than spec. (max.).
2. For speed, the allowable decrease is less than 15%.
3. For noise, the limit is less than spec.(max.). + 3 dB

Temperature for MTTF Estimation (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	11.31	1,865,025	266,432
30	8.00	1,318,772	188,396
40	4.00	659,386	94,198
50	2.00	329,693	47,099
60	1.00	164,846	23,549
Test Result			<input checked="" type="checkbox"/> Accept <input type="checkbox"/> Reject

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
TH02FNL002	1920.00	2004/2/2 8:00 AM		



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)
4,968	2002/10/20 8:00 AM	2003/8/3 8:15 AM	56	0	9360.0

representative Test P/N : 8X771	Current Test Status	<input type="checkbox"/>	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination
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Instruments used: 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample P/N : 8X771

Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)
	Current Spec. (A) 0.68 Max.	Current Spec. (A) 0.68 Max.		Speed Spec. (RPM) 10000 Ref.	Speed Spec. (RPM) 10000-15%		Noise Spec. (dB A) 61.5 Max.	Noise Spec. (dB A) 64.5 Max.	
1	0.58	0.55	-5.2	10036	10090	0.5	59.1	60.4	2.1
2	0.60	0.54	-10.0	10702	10268	-4.1	59.0	59.8	1.3
3	0.60	0.55	-8.3	9952	10257	3.1	59.0	60.7	2.9
4	0.58	0.54	-6.9	9962	9968	0.1	59.7	60.4	1.1
5	0.60	0.54	-10.0	10226	10226	0.0	59.0	60.6	2.8
6	0.60	0.54	-10.0	9902	9983	0.8	59.6	59.8	0.3
7	0.60	0.53	-11.7	9790	10117	3.3	59.3	60.1	1.3
8	0.61	0.54	-11.5	9892	10132	2.4	59.2	61.2	3.3
9	0.58	0.54	-6.9	9889	10041	1.5	59.8	59.8	0.0
10	0.58	0.54	-6.9	10071	9931	-1.4	59.9	59.8	-0.1
11	0.59	0.53	-10.2	10112	10254	1.4	59.0	61.2	3.8
12	0.59	0.54	-8.5	10118	10234	1.1	59.3	60.7	2.4
13	0.60	0.54	-10.0	10112	10189	0.8	58.7	61.2	4.3
14	0.58	0.54	-6.9	10056	10137	0.8	58.9	60.5	2.7
15	0.59	0.54	-8.5	9928	9982	0.5	59.6	60.3	1.1
16	0.59	0.54	-8.5	10002	10081	0.8	60.1	60.4	0.5
17	0.61	0.53	-13.1	10154	10160	0.1	60.2	61.4	2.0
18	0.60	0.54	-10.0	10112	10236	1.2	59.4	60.7	2.1
19	0.58	0.53	-8.6	9837	10105	2.7	59.8	60.4	1.1
20	0.59	0.54	-8.5	10242	10149	-0.9	59.9	61.5	2.6
21	0.60	0.53	-11.7	10118	10160	0.4	59.7	61.1	2.4
22	0.60	0.54	-10.0	10128	10253	1.2	59.4	60.8	2.3
23	0.58	0.54	-6.9	9897	9766	-1.3	59.5	60.4	1.5
24	0.58	0.57	-1.7	10024	10256	2.3	59.8	59.7	-0.2
25	0.58	0.57	-1.7	9856	10321	4.7	59.8	59.8	0.1
26	0.58	0.56	-3.4	9946	9998	0.5	57.5	60.2	4.7
27	0.58	0.54	-6.9	9922	9983	0.6	57.9	60.3	4.2
28	0.58	0.55	-5.2	10121	10255	1.3	58.6	59.7	1.8
29	0.59	0.54	-8.5	10108	10112	0.0	59.4	59.7	0.4
30	0.59	0.55	-6.8	9922	9925	0.0	59.3	59.9	1.0
31	0.60	0.56	-6.7	10012	10112	1.0	57.9	58.7	1.4
32	0.60	0.56	-6.7	9982	10252	2.7	58.2	58.6	0.8
33	0.60	0.57	-5.0	9936	9998	0.6	59.7	60.0	0.5
34	0.59	0.58	-1.7	9915	9965	0.5	59.6	60.7	1.8
35	0.60	0.57	-5.0	10056	10025	-0.3	59.0	60.6	2.7



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GFB0412SHE

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
4,968	2002/10/20 8:00 AM	2003/8/3 8:15 AM	56	0	9360.0

representative Test P/N : 8X771

Current Test Status



In process

In process
(exceed requested)

Termination

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Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)
	Current Spec. (A) 0.68 Max.	Current Spec. (A) 0.68 Max.		Speed Spec. (RPM) 10000 Ref.	Speed Spec. (RPM) 10000-15%		Noise Spec. (dB A) 61.5 Max.	Noise Spec. (dB A) 64.5 Max.	
36	0.58	0.56	-3.4	9981	9996	0.2	59.1	61.2	3.5
37	0.60	0.56	-6.7	10056	10112	0.6	59.5	61.4	3.1
38	0.60	0.55	-8.3	9969	9987	0.2	59.5	60.3	1.3
39	0.59	0.54	-8.5	10108	10025	-0.8	59.7	60.8	1.8
40	0.60	0.56	-6.7	10254	10198	-0.5	59.3	61.3	3.4
41	0.60	0.55	-8.3	9931	9995	0.6	59.4	60.5	1.9
42	0.59	0.54	-8.5	9870	9985	1.2	60.1	60.4	0.5
43	0.58	0.54	-6.9	9986	9978	-0.1	58.8	61.3	4.3
44	0.59	0.54	-8.5	9936	10013	0.8	58.4	60.3	3.2
45	0.58	0.55	-5.2	9870	10056	1.9	58.7	61.2	4.3
46	0.58	0.56	-3.4	9779	10045	2.7	59.9	61.3	2.4
47	0.60	0.56	-6.7	9854	10054	2.0	58.8	60.7	3.2
48	0.60	0.54	-10.0	10114	10122	0.1	57.9	61.3	5.8
49	0.59	0.55	-6.8	10056	10106	0.5	59.7	60.4	1.2
50	0.60	0.54	-10.0	9928	9977	0.5	59.6	60.1	0.8
51	0.60	0.55	-8.3	10002	9933	-0.7	59.5	60.2	1.1
52	0.59	0.55	-6.8	10214	10021	-1.9	58.8	60.5	2.9
53	0.59	0.54	-8.5	9962	10035	0.7	58.5	60.5	3.5
54	0.59	0.56	-5.1	9896	10027	1.3	59.6	61.3	2.8
55	0.59	0.57	-3.4	10062	10008	-0.5	60.1	60.5	0.6
56	0.59	0.57	-3.4	10070	10125	0.5	61.0	60.4	-1.0
X-Bar	0.59	0.55	-	10016.71	10084.27	-	59.28	60.48	-
σ	0.02	0.02	-	280.21	192.46	-	1.33	1.12	-

QE File No.	Time-out for function test or others (hrs)	Issued Date	Reported By	Approved By
TH02FNL002	1920.00	2004/2/2 8:00 AM		