

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 GFM 80x80x56.0 mm series as the right table	GFM0812SS-03F8N				
	GFC0848SS-00EQR				

Representative Test P/N : GFM0812SS-03EG4

Equipment: 1.Oven: E24-T0167	On/Off Cycles: Every 500 hours
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© **L₁₀ Expectancy: 70,000 hours minimum @ fan rated voltage and the temperature of 40℃**

According to the equation for **Weibull distribution**, **MTTF $\hat{=}$ 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 Ts (℃) (Actual Test Temperature)	Unstress Temperature Tu (℃)	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 ℃ (hours)	Verified L ₁₀ 40 ℃ (hours)
70	40	8.00	56	2.303	3,478	3,478.0	490,031	70,004

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2018/12/8 8:00 AM	2020/2/23 11:46 PM	☐ In process	☒ In process (exceed requested)	☐ Termination	3478.0

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 (℃)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	22.63	1,386,017	198,002
30	16.00	980,062	140,009
40	8.00	490,031	70,004
50	4.00	245,015	35,002
60	2.00	122,508	17,501
70	1.00	61,254	8,751
Test Result		☒ Accept	☐ Reject

Fan permission criteria for the measurement after test :

- Speed can not drop of $\geq 15\%$ below the original measured rpm.
- Current cannot increase $> 15\%$ of original measure current.
- Noise cannot $> 3\text{dB}$ over the original measure noise.

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG18FNL109	7146.00	2020/2/24	Loly.Wang	Tim Yi



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				GFC0848SS-00EQR					
Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)				
3,478	2018/12/8 8:00 AM	2020/2/23 11:46 PM	56	0	3478.0				
Representative Test P/N : GFM0812SS-03EG4			Current Test Status		☐ In process	☒ In process (exceed requested)	☐ Termination		
Equipment: 1.Oven: E24-T0167				On/Off Cycles: Every 500 hours					
Test Data Between Initial Test and Final Test									
Sample No.	Initial Test Current Spec. (A) 9.6 Max.	Final Test Current Spec. (A) 9.6 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 14670-17930 13950-17050	Final Test Speed Spec. (RPM) 14670-17930 13950-17050	Deviation (%)	Initial Test Noise Spec. (dB A) 83.0 Max	Final Test Noise Spec. (dB A) 83.0 Max	Deviation 3 dBMax.
1	4. 77	4. 67	-2.0	16377	16224	-0.9	78.7	79.1	0.4
				15574	15408	-1.1			
2	4. 71	4. 75	0.8	16396	16221	-1.1	78.5	80.2	1.7
				15577	15493	-0.5			
3	4. 71	4. 71	-0.1	16347	16204	-0.9	78.8	79.5	0.7
				15569	15415	-1.0			
4	4. 77	4. 71	-1.3	16388	16311	-0.5	78.8	79.7	0.9
				15607	15359	-1.6			
5	4. 73	4. 72	-0.2	16459	16295	-1.0	79.0	80.5	1.5
				15573	15433	-0.9			
6	4. 74	4. 75	0.3	16469	16312	-1.0	78.6	80.6	2.0
				15563	15368	-1.3			
7	4. 76	4. 75	-0.1	16369	16250	-0.7	78.8	80.6	1.8
				15584	15441	-0.9			
8	4. 79	4. 72	-1.3	16372	16308	-0.4	78.4	80.2	1.8
				15602	15411	-1.2			
9	4. 73	4. 73	0.0	16339	16328	-0.1	78.9	80.2	1.3
				15552	15462	-0.6			
10	4. 67	4. 75	1.8	16413	16310	-0.6	78.6	80.9	2.3
				15537	15372	-1.1			
11	5. 21	4. 77	-8.6	16424	16292	-0.8	78.5	80.8	2.3
				15559	15460	-0.6			
12	4. 69	4. 74	1.0	16325	16298	-0.2	78.7	80.5	1.8
				15583	15382	-1.3			
13	4. 77	4. 71	-1.4	16391	16248	-0.9	79.4	81.2	1.8
				15573	15411	-1.0			
14	4. 62	4. 57	-1.1	16302	16229	-0.4	78.5	80.3	1.8
				15533	15476	-0.4			
15	5. 20	4. 75	-8.8	16489	16370	-0.7	78.7	80.7	2.0
				15530	15403	-0.8			
16	5. 03	4. 70	-6.4	16195	16248	0.3	79.9	80.4	0.5
				15561	15419	-0.9			
17	5. 26	4. 63	-11.9	16185	16242	0.4	78.8	80.5	1.7
				15642	15380	-1.7			
18	5. 57	4. 64	-16.8	15834	16210	2.4	79.8	81.1	1.3
				15628	15453	-1.1			
QE File No.	Time-out for function test or others (hours)		Issued Date		Reported By		Approved By		
DG18FNL109	7146.00		2020/2/24		Loly.Wang		Tim Yi		



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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)				
3,478	2018/12/8 8:00 AM	2020/2/23 11:46 PM	56	0	3478.0				
Representative Test P/N : GFM0812SS-03EG4			Current Test Status	☐ In process	☒ In process (exceed requested)	☐ Termination			
Equipment: 1.Oven: E24-T0167				On/Off Cycles: Every 500 hours					
Test Data Between Initial Test and Final Test									
Sample No.	Initial Test Current Spec. (A) 9.6 Max.	Final Test Current Spec. (A) 9.6 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 14670-17930 13950-17050	Final Test Speed Spec. (RPM) 14670-17930 13950-17050	Deviation (%)	Initial Test Noise Spec. (dB A) 83.0 Max	Final Test Noise Spec. (dB A) 83.0 Max	Deviation 3 dBMax.
19	4. 66	4. 69	0.8	16502	16272	-1.4	78.9	80.5	1.6
				15585	15428	-1.0			
20	5. 14	4. 64	-9.6	16447	16271	-1.1	78.9	80.4	1.5
				15577	15361	-1.4			
21	4. 75	4. 66	-1.9	16520	16311	-1.3	78.8	80.4	1.6
				15586	15444	-0.9			
22	4. 83	4. 70	-2.7	16493	16276	-1.3	78.9	80.4	1.5
				15554	15311	-1.6			
23	5. 19	4. 71	-9.2	16315	16277	-0.2	79.3	80.7	1.4
				15494	15436	-0.4			
24	4. 72	4. 57	-3.2	16339	16224	-0.7	78.9	81.3	2.4
				15485	15375	-0.7			
25	4. 80	4. 68	-2.4	16139	16182	0.3	79.3	80.6	1.3
				15612	15405	-1.3			
26	5. 55	4. 72	-14.9	16162	16293	0.8	79.2	79.8	0.6
				15655	15438	-1.4			
27	4. 69	4. 71	0.4	16383	16292	-0.6	78.9	80.6	1.7
				15497	15439	-0.4			
28	4. 72	4. 67	-1.0	16361	16240	-0.7	78.8	80.6	1.8
				15569	15371	-1.3			
29	4. 66	4. 72	1.3	16296	16296	0.0	79.0	80.4	1.4
				15478	15435	-0.3			
30	4. 78	4. 67	-2.3	16385	16236	-0.9	79.5	80.9	1.4
				15570	15453	-0.8			
31	4. 56	4. 77	4.5	16319	16259	-0.4	79.2	79.3	0.1
				15484	15426	-0.4			
32	4. 68	4. 62	-1.3	16391	16199	-1.2	79.4	78.9	-0.5
				15516	15336	-1.2			
33	4. 61	4. 69	1.7	16355	16327	-0.2	79.1	80.5	1.4
				15484	15452	-0.2			
34	4. 65	4. 76	2.3	16368	16399	0.2	79.3	79.4	0.1
				15584	15441	-0.9			
35	4. 80	4. 63	-3.4	16459	16240	-1.3	79.5	81.3	1.8
				15510	15377	-0.9			
36	4. 83	4. 71	-2.3	16437	16353	-0.5	79.8	81.3	1.5
				15585	15391	-1.2			
37	4. 74	4. 66	-1.9	16356	16292	-0.4	79.4	80.9	1.5
				15537	15480	-0.4			
QE File No.	Time-out for function test or others (hours)		Issued Date		Reported By		Approved By		
DG18FNL109	7146.00		2020/2/24		Loly.Wang		Tim Yi		



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GFC0848SS-00EQR				

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3,478	2018/12/8 8:00 AM	2020/2/23 11:46 PM	56	0	3478.0

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Equipment: 1.Oven: E24-T0167	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) 9.6 Max.	Final Test Current Spec. (A) 9.6 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 14670-17930 13950-17050	Final Test Speed Spec. (RPM) 14670-17930 13950-17050	Deviation (%)	Initial Test Noise Spec. (dB A) 83.0 Max	Final Test Noise Spec. (dB A) 83.0 Max	Deviation
38	4.73	4.64	-1.9	16466	16286	-1.1	79.8	81.1	1.3
				15622	15370	-1.6			
39	4.68	4.69	0.3	16418	16250	-1.0	79.5	80.6	1.1
				15552	15434	-0.8			
40	4.70	4.67	-0.6	16298	16281	-0.1	79.3	81.2	1.9
				15586	15391	-1.3			
41	4.60	4.66	1.3	16097	16240	0.9	79.6	80.6	1.0
				15509	15360	-1.0			
42	4.60	4.76	3.6	16320	16341	0.1	78.7	79.1	0.4
				15566	15460	-0.7			
43	4.66	4.64	-0.4	16349	16199	-0.9	79.4	80.2	0.8
				15527	15417	-0.7			
44	4.73	4.67	-1.3	16440	16299	-0.9	80.7	80.5	-0.2
				15581	15436	-0.9			
45	4.92	4.72	-4.2	16348	16416	0.4	79.5	81.1	1.6
				15594	15400	-1.2			
46	4.95	4.73	-4.6	16289	16300	0.1	79.6	81.1	1.5
				15702	15499	-1.3			
47	4.71	4.73	0.3	16345	16324	-0.1	79.4	81.2	1.8
				15452	15522	0.5			
48	4.63	4.68	1.2	16291	16296	0.0	79.2	80.7	1.5
				15514	15451	-0.4			
49	4.77	4.62	-3.2	16334	16268	-0.4	79.2	81.1	1.9
				15628	15383	-1.6			
50	4.58	4.65	1.6	16378	16317	-0.4	79.1	80.4	1.3
				15490	15414	-0.5			
51	5.12	4.66	-8.9	16443	16270	-1.1	79.6	80.3	0.7
				15452	15396	-0.4			
52	4.66	4.70	0.9	15976	16328	2.2	79.2	80.5	1.3
				15540	15457	-0.5			
53	4.77	4.67	-2.0	16433	16339	-0.6	79.3	80.6	1.3
				15438	15478	0.3			
54	5.11	4.68	-8.4	16121	16317	1.2	78.7	80.4	1.7
				15476	15435	-0.3			
55	5.34	4.68	-12.3	16416	16344	-0.4	79.3	80.5	1.2
				15554	15415	-0.9			
56	5.28	4.70	-11.0	16382	16356	-0.2	79.7	81.3	1.6
				15483	15418	-0.4			
X-Bar	4.832	4.690	-	15948.393	15851.705	-	79.148	80.495	-
σ	0.243	0.046	-	408.765	436.797	-	0.441	0.578	-

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