



# 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	GFM0812DS-SMX01				
	GFM0812DS-SMB7R				
<b>Representative Test P/N : GFM0812DS-DA74</b> <span style="float: right; font-size: small;">F:4102068500 I:4103090700 Date Code: 3904PR</span>					
<b>Equipment: 1.Oven: E24-F0118</b>				On/Off Cycles: Every 500 hours	

◎ **L<sub>10</sub> Expectancy: 50,000 hours minimum @ fan rated voltage and the temperature of 60°C**  
 According to the equation for **Weibull distribution**, **MTTF ≅ 7×L<sub>10</sub> = 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<sub>r,c</sub>) 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 <sub>s</sub> (°C) <small>(Actual Test Temperature)</small>	Unstress Temperature T <sub>u</sub> (°C)	Acceleration Factor A <sub>F</sub>	Quantity of Test Devices n (pcs)	Poisson Distribution Factor B <sub>r,c</sub>	Required test time with zero failure t (hours)	Actual test time with zero failure t (hours)	Verified MTTF 60 °C (hours)	Verified L <sub>10</sub> 60 °C (hours)
60	60	1.00	56	2.303	19,873	13,360.0	235,294	33,613

**Test Progress:**

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status	Current Total Test Time (hours)
2013/10/12 8:00 AM	2017/5/14 9:02 AM	<input checked="" type="checkbox"/> In process <input type="checkbox"/> In process (exceed requested) <input type="checkbox"/> Termination	<b>13360.0</b>

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' L<sub>10</sub> 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 <sub>F</sub>	Estimated MTTF (hours)	Estimated L <sub>10</sub> (hours)
25	11.31	2,662,044	380,292
30	8.00	1,882,350	268,907
40	4.00	941,175	134,454
45	2.83	665,511	95,073
50	2.00	470,587	67,227
60	1.00	235,294	33,613

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	<input checked="" type="checkbox"/> <b>Accept</b> <input type="checkbox"/> <b>Reject</b>
-------------	---

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG13FNL145	11568.00	2016/8/16	Dongqian.Liang	Tim Yi

BGN (dBA) :15.0

Temp (°C) : 23.8



## DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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				GFM0812DS-SMX01					
				GFM0812DS-SMB7R					
<b>Required Test Time (hrs)</b>	<b>Date for Test Beginning</b>	<b>Date for Test Termination</b>	<b>Sample Size (pcs):</b>	<b>Failure (pcs):</b>	<b>Current Total Test Time (hrs)</b>				
19,873	2013/10/12 8:00 AM	2017/5/14 9:02 AM	56	0	<b>13360.0</b>				
Representative Test P/N : GFM0812DS-DA74				<b>Current Test Status</b>	<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination		
Equipment: 1.Oven: E24-F0118						On/Off Cycles: Every 500 hours			
<b>Test Data Between Initial Test and Final Test</b>									
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
	<b>2.88 Max.</b>	<b>2.88 Max.</b>		<b>11250-13750 9900-12100</b>	<b>11250-13750 9900-12100</b>		<b>77.3 Max</b>	<b>77.3 Max</b>	
1	2.29	2.18	-4.5	12503	12402	-0.8	72.7	72.7	0.0
				11013	10452	-5.1			
2	2.25	2.18	-2.8	12596	12291	-2.4	72.2	71.3	-0.9
				10909	9925	-9.0			
3	2.23	2.18	-1.9	12364	12433	0.6	72.4	71.2	-1.2
				10917	10666	-2.3			
4	2.25	2.19	-3.1	12405	12469	0.5	72.6	71.4	-1.2
				10927	10757	-1.6			
5	2.27	2.19	-3.6	12473	12449	-0.2	72.8	71.8	-1.0
				10945	10845	-0.9			
6	2.22	2.19	-1.7	12408	12537	1.0	72.4	71.3	-1.1
				10973	10655	-2.9			
7	2.23	2.19	-2.1	12332	12346	0.1	72.2	70.3	-1.9
				10813	10884	0.7			
8	2.23	2.19	-2.0	12425	12474	0.4	72.4	71.7	-0.7
				10904	10836	-0.6			
9	2.28	2.19	-3.8	12451	12500	0.4	72.6	71.6	-1.0
				10977	10899	-0.7			
10	2.25	2.19	-2.6	12391	12488	0.8	72.8	70.7	-2.1
				10877	10818	-0.5			
11	2.28	2.19	-4.0	12407	12407	0.0	72.3	71.9	-0.4
				11008	10797	-1.9			
12	2.31	2.19	-5.0	12582	12612	0.2	72.5	71.8	-0.7
				11091	10188	-8.1			
13	2.26	2.19	-2.7	12382	12424	0.3	72.7	71.3	-1.4
				11002	10538	-4.2			
14	2.29	2.20	-4.3	12387	12496	0.9	72.2	72.0	-0.2
				10925	10879	-0.4			
15	2.28	2.20	-3.6	12531	12615	0.7	72.4	72.2	-0.2
				10983	10884	-0.9			
16	2.25	2.20	-2.4	12402	12816	3.3	72.6	72.1	-0.5
				10905	10827	-0.7			
17	2.27	2.20	-3.2	12461	12459	0.0	72.8	71.7	-1.1
				10996	10852	-1.3			
18	2.24	2.20	-1.7	12409	12386	-0.2	72.3	72.0	-0.3
				10965	10858	-1.0			
<b>QE File No.</b>	<b>Time-out for function test or others (hours)</b>		<b>Issued Date</b>		<b>Reported By</b>		<b>Approved By</b>		
DG13FNL145	11568.00		2016/8/16		Dongqian.Liang		Tim Yi		



## DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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				GFM0812DS-SMX01					
				GFM0812DS-SMB7R					
<b>Required Test Time (hrs)</b>	<b>Date for Test Beginning</b>	<b>Date for Test Termination</b>	<b>Sample Size (pcs):</b>	<b>Failure (pcs):</b>	<b>Current Total Test Time (hrs)</b>				
19,873	2013/10/12 8:00 AM	2017/5/14 9:02 AM	56	0	<b>13360.0</b>				
Representative Test P/N : GFM0812DS-DA74				<b>Current Test Status</b>	<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination		
Equipment: 1.Oven: E24-F0118				On/Off Cycles: Every 500 hours					
<b>Test Data Between Initial Test and Final Test</b>									
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
	2.88 Max.	2.88 Max.		11250-13750 9900-12100	11250-13750 9900-12100		77.3 Max	77.3 Max	
19	2.22	2.20	-0.9	12372	12439	0.5	72.5	71.4	-1.1
				10998	10842	-1.4			
20	2.26	2.20	-2.4	12348	12393	0.4	72.7	72.1	-0.6
				10970	10809	-1.5			
21	2.24	2.20	-1.8	12400	12435	0.3	72.2	72.0	-0.2
				10964	10983	0.2			
22	2.28	2.20	-3.2	12435	12497	0.5	72.4	71.6	-0.8
				11034	10856	-1.6			
23	2.37	2.20	-6.9	12367	12475	0.9	72.6	72.0	-0.6
				11048	10894	-1.4			
24	2.22	2.21	-0.8	12341	12399	0.5	72.8	72.1	-0.7
				10924	10876	-0.4			
25	2.32	2.21	-4.7	12416	12570	1.2	72.3	71.9	-0.4
				10974	10957	-0.2			
26	2.29	2.21	-3.5	12364	12370	0.0	72.5	72.1	-0.4
				10997	10886	-1.0			
27	2.29	2.21	-3.7	12334	12379	0.4	72.7	71.5	-1.2
				10887	10893	0.1			
28	2.25	2.21	-1.8	12407	12535	1.0	72.2	71.3	-0.9
				10986	10849	-1.2			
29	2.27	2.21	-2.4	12383	12369	-0.1	72.3	71.0	-1.3
				10963	10869	-0.9			
30	2.24	2.21	-1.3	12384	12351	-0.3	72.5	72.0	-0.5
				10981	10869	-1.0			
31	2.23	2.21	-0.6	12610	12442	-1.3	72.7	71.9	-0.8
				10901	10810	-0.8			
32	2.24	2.21	-1.4	12502	12522	0.2	72.2	71.7	-0.5
				10945	10776	-1.5			
33	2.24	2.21	-1.1	12492	12424	-0.5	72.4	71.9	-0.5
				10999	10927	-0.7			
34	2.28	2.22	-2.8	12570	12415	-1.2	72.8	72.7	-0.1
				11001	10748	-2.3			
35	2.29	2.22	-3.1	12518	12534	0.1	72.3	71.7	-0.6
				10941	10940	0.0			
36	2.29	2.22	-3.0	12537	12574	0.3	72.5	72.3	-0.2
				10934	10748	-1.7			
37	2.22	2.22	0.1	12523	12432	-0.7	72.7	71.2	-1.5
				10881	10857	-0.2			
<b>QE File No.</b>	<b>Time-out for function test or others (hours)</b>		<b>Issued Date</b>		<b>Reported By</b>		<b>Approved By</b>		
DG13FNL145	11568.00		2016/8/16		NaNa.Wang		Tim Yi		



## DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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

GFM0812DS-SMX01				
GFM0812DS-SMB7R				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
19,873	2013/10/12 8:00 AM	2017/5/14 9:02 AM	56	0	<b>13360.0</b>
Representative Test P/N : GFM0812DS-DA74			<b>Current Test Status</b>	<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested) <span style="margin-left: 20px;"><input type="checkbox"/> Termination</span>

Equipment: 1.Oven: E24-F0118 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
	<b>2.88 Max.</b>	<b>2.88 Max.</b>		<b>11250-13750 9900-12100</b>	<b>11250-13750 9900-12100</b>		<b>77.3 Max</b>	<b>77.3 Max</b>	
38	2.27	2.22	-2.4	12505	12527	0.2	72.2	71.8	-0.4
				10998	10842	-1.4			
39	2.30	2.22	-3.6	12382	12301	-0.7	72.4	71.3	-1.1
				10958	10842	-1.1			
40	2.23	2.22	-0.2	12391	12468	0.6	72.6	71.7	-0.9
				10894	10860	-0.3			
41	2.27	2.22	-2.2	12472	12623	1.2	72.8	71.6	-1.2
				10962	10788	-1.6			
42	2.29	2.22	-3.0	12480	12374	-0.8	72.3	72.8	0.5
				11095	10800	-2.7			
43	2.26	2.22	-1.4	12423	12456	0.3	72.5	71.5	-1.0
				11007	10870	-1.2			
44	2.26	2.23	-1.5	12533	12547	0.1	72.7	71.9	-0.8
				10835	10891	0.5			
45	2.27	2.23	-1.9	12542	12593	0.4	72.2	70.9	-1.3
				10976	10967	-0.1			
46	2.25	2.23	-1.1	12409	12374	-0.3	72.4	71.0	-1.4
				10989	10894	-0.9			
47	2.25	2.23	-1.2	12552	12517	-0.3	72.6	72.1	-0.5
				10940	10823	-1.1			
48	2.23	2.23	-0.2	12488	12460	-0.2	72.8	71.9	-0.9
				10959	10859	-0.9			
49	2.26	2.23	-1.2	12471	12473	0.0	72.3	71.9	-0.4
				11052	10826	-2.0			
50	2.23	2.23	0.1	12479	12454	-0.2	72.5	72.1	-0.4
				10944	10790	-1.4			
51	2.30	2.23	-2.9	12477	12464	-0.1	72.7	72.0	-0.7
				10984	10791	-1.8			
52	2.31	2.23	-3.5	12442	12536	0.8	72.2	71.6	-0.6
				10908	10867	-0.4			
53	2.26	2.23	-1.3	12419	12464	0.4	72.4	71.7	-0.7
				10934	10863	-0.6			
54	2.22	2.24	0.5	12601	12469	-1.0	72.6	71.2	-1.4
				10920	10868	-0.5			
55	2.24	2.24	0.0	12507	12497	-0.1	72.8	70.3	-2.5
				10942	10954	0.1			
56	2.29	2.24	-2.4	12418	12436	0.1	72.3	71.3	-1.0
				10939	10934	0.0			
X-Bar	2.262	2.210	-	11704.4	11638.125	-	72.49	36.162	-
$\sigma$	0.030	0.016	-	751.740	844.639	-	0.206	36.002	-

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG13FNL145	11568.00	2016/8/16	Dongqian.Liang	Tim Yi