



## 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 <b>GFM 60x60x56.0 mm</b> series as the right table	GFC0648SS-00E49			
	GFM0612SS-00ENZ			
	GFB0612ES-E			
<b>Representative Test P/N :GFM0612SS-00DG9</b>				
<b>Equipment: 1.Oven: E24-T0167</b>			On/Off Cycles: Every 500 hours	

**☉ L<sub>10</sub> Expectancy:**                    **30,000**    hours minimum @ fan rated voltage and the temperature of 55°C  
 According to the equation for **Weibull distribution**,                    **MTTF ≅ 7×L<sub>10</sub> =**                    **210,000**    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) (Actual Test Temperature)	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 55 °C (hours)	Verified L <sub>10</sub> 55 °C (hours)
<b>70</b>	<b>55</b>	<b>2.83</b>	<b>56</b>	<b>2.303</b>	<b>4,216</b>	<b>5,216.0</b>	<b>259,828</b>	<b>37,118</b>

**Test Progress:**

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2017/9/19 7:00 PM	2019/6/2 11:42 PM	<input type="checkbox"/> In process	<input checked="" type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination	<b>5216.0</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	22.63	2,078,626	296,947
30	16.00	1,469,811	209,973
40	8.00	734,905	104,986
50	4.00	367,453	52,493
55	2.83	259,828	37,118
60	2.00	183,726	26,247
70	1.00	91,863	13,123

- 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.

<b>Test Result</b>	<input checked="" type="checkbox"/> <b>Accept</b> <input type="checkbox"/> <b>Reject</b>
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QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG17FNL126	13677.00	2019/11/16	Loly.Wang	Tim Yi



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	GFM0612SS-00ENZ				
	GFB0612ES-E				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
4,216	2017/9/19 7:00 PM	2019/6/2 11:42 PM	56	0	<b>5216.0</b>

Representative Test P/N :GFM0612SS-00DG9	<b>Current Test Status</b>	<input type="checkbox"/> In process	<input checked="" type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination
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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)	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>7.4 Max.</b>	<b>7.4 Max.</b>		<b>20070-24530 21870-26730</b>	<b>20070-24530 21870-26730</b>		<b>86.0 Max</b>	<b>86.0 Max</b>	
1	3.83	3.80	-0.8	21962	22047	0.4	81.0	83.6	2.6
				24302	24220	-0.3			
2	3.86	3.87	0.2	21889	21758	-0.6	82.1	83.5	1.4
				24447	24330	-0.5			
3	3.85	3.81	-1.0	21846	21972	0.6	82.6	82.4	-0.2
				24435	24497	0.3			
4	3.75	3.82	2.0	21986	21906	-0.4	81.7	83.8	2.1
				24278	24155	-0.5			
5	3.81	4.16	9.3	21889	22003	0.5	80.7	83.0	2.3
				24289	23265	-4.2			
6	3.83	3.91	1.9	21866	21970	0.5	81.9	83.2	1.3
				24403	24359	-0.2			
7	3.79	3.76	-0.8	21856	21881	0.1	80.1	82.0	1.9
				24299	24252	-0.2			
8	3.83	3.97	3.6	21852	21824	-0.1	80.3	81.6	1.3
				24259	23557	-2.9			
9	3.82	3.90	2.1	21877	21934	0.3	81.6	82.8	1.2
				24367	24279	-0.4			
10	3.76	3.89	3.5	21719	21938	1.0	80.1	82.7	2.6
				24214	24106	-0.4			
11	3.79	3.97	4.6	21871	21920	0.2	80.9	83.8	2.9
				24292	24006	-1.2			
12	3.83	4.24	10.6	21735	21826	0.4	81.2	83.4	2.2
				24301	23270	-4.2			
13	3.81	3.88	1.6	21931	22132	0.9	80.5	83.2	2.7
				24286	24348	0.3			
14	3.88	3.88	-0.2	21932	21854	-0.4	81.3	83.5	2.2
				24317	24217	-0.4			
15	3.89	3.79	-2.5	21934	21775	-0.7	81.0	83.0	2.0
				24288	24231	-0.2			
16	3.86	4.24	9.7	21911	22046	0.6	80.9	82.6	1.7
				24291	23283	-4.1			
17	3.81	4.05	6.5	21914	21788	-0.6	81.4	83.5	2.1
				24316	23503	-3.3			
18	3.81	3.86	1.4	21883	21861	-0.1	81.6	83.1	1.5
				24339	24252	-0.4			

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG17FNL126	13677.00	2019/11/16	Loly.Wang	Tim Yi



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GFC0648SS-00E49			
GFM0612SS-00ENZ			
GFB0612ES-E			

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
4,216	2017/9/19 7:00 PM	2019/6/2 11:42 PM	56	0	<b>5216.0</b>

Representative Test P/N :GFM0612SS-00DG9	<b>Current Test Status</b>	<input type="checkbox"/> In process	<input checked="" type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination
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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 )	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>7.4 Max.</b>	<b>7.4 Max.</b>		<b>20070-24530</b>	<b>20070-24530</b>		<b>86.0 Max</b>	<b>86.0 Max</b>	
19	3.83	4.17	8.9	21898	21851	-0.2	81.7	82.2	0.5
				24368	23157	-5.0			
20	3.88	3.89	0.4	21822	21844	0.1	82.0	82.4	0.4
				24504	24238	-1.1			
21	3.82	3.84	0.3	21934	22030	0.4	81.5	83.4	1.9
				24257	24302	0.2			
22	3.88	3.93	1.3	21929	21856	-0.3	81.5	84.1	2.6
				24416	24108	-1.3			
23	3.84	4.26	10.8	21962	21801	-0.7	82.0	83.4	1.4
				24367	23138	-5.0			
24	3.83	3.80	-0.8	21833	22075	1.1	80.5	82.9	2.4
				24324	24309	-0.1			
25	4.04	3.87	-4.2	21374	21951	2.7	82.4	82.9	0.5
				24324	24346	0.1			
26	3.82	3.89	1.8	21885	21941	0.3	81.6	83.4	1.8
				24333	24365	0.1			
27	3.75	3.78	0.7	22006	21759	-1.1	81.8	84.0	2.2
				24240	24352	0.5			
28	3.82	3.85	0.8	21926	22064	0.6	82.6	82.0	-0.6
				24397	24422	0.1			
29	3.89	4.15	6.9	21942	21954	0.1	80.3	82.2	1.9
				24307	23401	-3.7			
30	3.80	3.87	1.9	21932	21350	-2.7	81.4	83.5	2.1
				24285	24221	-0.3			
31	3.82	3.73	-2.2	21898	21759	-0.6	82.1	84.0	1.9
				24315	24217	-0.4			
32	3.85	3.90	1.3	21902	21948	0.2	81.6	83.4	1.8
				24397	24299	-0.4			
33	3.87	3.84	-0.7	21914	21986	0.3	81.7	82.2	0.5
				24484	24242	-1.0			
34	4.18	3.83	-8.4	21193	21996	3.8	80.6	82.4	1.8
				24484	24301	-0.7			
35	3.86	3.93	1.9	21963	21943	-0.1	81.8	83.6	1.8
				24396	24345	-0.2			
36	3.84	3.77	-1.7	21928	22048	0.5	81.5	82.3	0.8
				24405	24401	0.0			
37	3.85	3.83	-0.4	21880	21813	-0.3	81.7	83.0	1.3
				24349	24397	0.2			

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Representative Test P/N :GFM0612SS-00DG9	<b>Current Test Status</b>	<input type="checkbox"/> In process	<input checked="" type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination
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Equipment: 1.Oven: E24-T0167	On/Off Cycles: Every 500 hours
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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
	7.4 Max.	7.4 Max.		20070-24530 21870-26730	20070-24530 21870-26730		86.0 Max	86.0 Max	
38	3.85	3.85	0.0	21966	21841	-0.6	82.3	83.1	0.8
				24487	24483	0.0			
39	3.80	3.81	0.3	21903	21995	0.4	81.0	83.6	2.6
				24243	24213	-0.1			
40	3.79	3.98	4.8	21967	21997	0.1	82.1	84.5	2.4
				24403	24056	-1.4			
41	3.82	3.92	2.7	21766	21951	0.8	82.2	83.8	1.6
				24376	24106	-1.1			
42	3.82	3.93	2.9	21989	21940	-0.2	81.6	83.4	1.8
				24285	24253	-0.1			
43	3.84	3.95	2.7	22072	21975	-0.4	82.4	83.2	0.8
				24442	24318	-0.5			
44	3.86	3.85	-0.2	22000	22117	0.5	82.0	83.2	1.2
				24333	24333	0.0			
45	3.86	3.84	-0.5	21866	21803	-0.3	82.2	84.2	2.0
				24370	24254	-0.5			
46	3.85	4.02	4.4	21981	21963	-0.1	81.9	84.0	2.1
				24391	24058	-1.4			
47	3.84	3.83	-0.2	21884	21834	-0.2	81.2	83.8	2.6
				24337	24114	-0.9			
48	3.80	3.81	0.4	21892	21933	0.2	82.6	83.4	0.8
				24363	24415	0.2			
49	3.81	3.98	4.6	21945	21845	-0.5	81.8	83.1	1.3
				24318	24156	-0.7			
50	3.84	3.81	-0.7	21912	21702	-1.0	82.6	83.3	0.7
				24342	24201	-0.6			
51	3.84	3.89	1.4	21858	21796	-0.3	81.4	84.2	2.8
				24383	24006	-1.5			
52	3.80	4.13	8.5	21813	21857	0.2	81.0	83.6	2.6
				24335	23707	-2.6			
53	3.82	3.89	1.8	21915	21838	-0.4	79.6	82.3	2.7
				24158	23705	-1.9			
54	3.85	4.29	11.5	21943	21416	-2.4	81.2	82.8	1.6
				24419	24166	-1.0			
55	3.79	3.70	-2.3	21903	21761	-0.6	81.0	82.5	1.5
				24372	24264	-0.4			
56	3.84	3.80	-1.1	21748	21875	0.6	79.8	82.1	2.3
				24264	24207	-0.2			
X-Bar	3.839	3.914	-	23112.4	22995.973	-	81.45	83.145	-
$\sigma$	0.063	0.139	-	1242.316	1143.337	-	0.734	0.659	-

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