



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 92x92x56.0 mm series as the right table	GFC0948SS-00F4N			
	GFB0912ES-E			

Representative Test P/N : GFM0912HS-01D20

Equipment: 1.Oven: E24-T0167 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) (Actual Test Temperature)	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)
70	40	8.00	56	2.303	3,478	4,851.0	683,479	97,640

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2017/10/18 4:00 PM	2018/11/21 6:46 PM	<input type="checkbox"/> In process	<input checked="" type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination	4851.0

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	22.63	1,933,170	276,167
30	16.00	1,366,958	195,280
40	8.00	683,479	97,640
50	4.00	341,739	48,820
60	2.00	170,870	24,410
70	1.00	85,435	12,205

- Fan permission criteria for the measurement after test :
- Speed can not drop of ≥ 15% below the original measured rpm.
 - Current cannot increase > 15% of original measure current.
 - Noise cannot >3dB over the original measure noise.

Test Result Accept Reject

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG17FNL139	6101.00	2019/1/18	Poppy.Liang	Tim Yi



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	GFB0912ES-E				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2017/10/18 4:00 PM	2018/11/21 6:46 PM	56	0	4851.0

Representative Test P/N : GFM0912HS-01D20	Current Test Status	<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
	4.74 Max.	4.74 Max.		10080-12320 10260-12540	10080-12320 10260-12540		82.2 Max	82.2 Max	
1	3.65	3.70	1.4	11239	11017	-2.0	78.7	78.6	-0.1
				11494	11301	-1.7			
2	3.65	3.66	0.2	11241	10944	-2.6	78.6	78.4	-0.2
				11492	11345	-1.3			
3	3.66	3.63	-0.8	11233	10951	-2.5	79.3	78.0	-1.3
				11502	11272	-2.0			
4	3.66	3.65	-0.2	11240	10939	-2.7	78.8	77.7	-1.1
				11487	11298	-1.6			
5	3.68	4.18	13.6	11121	10391	-6.6	78.8	78.0	-0.8
				11585	11385	-1.7			
6	3.70	3.57	-3.4	11121	10905	-1.9	78.8	78.0	-0.8
				11500	11210	-2.5			
7	3.65	4.02	10.2	11126	10286	-7.5	78.4	77.7	-0.7
				11543	11226	-2.7			
8	3.66	3.62	-0.9	11089	10906	-1.7	79.5	78.2	-1.3
				11488	11223	-2.3			
9	3.67	3.63	-1.1	11088	10957	-1.2	78.8	78.4	-0.4
				11486	11302	-1.6			
10	3.69	3.54	-4.1	11069	10931	-1.2	79.1	78.4	-0.7
				11448	11167	-2.5			
11	3.69	3.62	-1.8	11139	10879	-2.3	78.8	78.5	-0.3
				11436	11296	-1.2			
12	3.66	3.61	-1.3	11154	10954	-1.8	79.5	78.2	-1.3
				11580	11164	-3.6			
13	3.69	3.63	-1.8	11135	10872	-2.4	80.0	78.9	-1.1
				11498	11250	-2.2			
14	3.68	3.69	0.1	11200	10942	-2.3	78.8	77.4	-1.4
				11554	11388	-1.4			
15	3.69	4.05	9.8	11075	10404	-6.1	79.2	78.0	-1.2
				11581	11201	-3.3			
16	3.64	3.59	-1.2	11089	10902	-1.7	79.6	77.8	-1.8
				11453	11204	-2.2			
17	3.66	3.73	1.9	11180	10956	-2.0	78.1	77.4	-0.7
				11468	11296	-1.5			
18	3.64	3.63	-0.3	11093	10939	-1.4	78.5	78.2	-0.3
				11449	11261	-1.6			

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG17FNL139	6101.00	2019/1/18	Poppy.Liang	Tim Yi



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GFC0948SS-00F4N				
GFB0912ES-E				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2017/10/18 4:00 PM	2018/11/21 6:46 PM	56	0	4851.0

Representative Test P/N : GFM0912HS-01D20	Current Test Status	<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) 4.74 Max.	Final Test Current Spec. (A) 4.74 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 10080-12320 10260-12540	Final Test Speed Spec. (RPM) 10080-12320 10260-12540	Deviation (%)	Initial Test Noise Spec. (dB A) 82.2 Max	Final Test Noise Spec. (dB A) 82.2 Max	Deviation
19	3.70	3.62	-2.2	11099	10849	-2.3	79.2	78.2	-1.0
				11556	11214	-3.0			
20	3.62	3.67	1.5	11084	10886	-1.8	79.6	78.5	-1.1
				11491	11322	-1.5			
21	3.68	3.61	-1.9	11166	10884	-2.5	79.2	78.2	-1.0
				11430	11265	-1.4			
22	3.64	3.61	-0.8	11170	10905	-2.4	79.0	78.3	-0.7
				11495	11213	-2.5			
23	3.69	3.63	-1.8	11159	10916	-2.2	79.1	78.3	-0.8
				11581	11213	-3.2			
24	3.63	4.03	11.0	11106	10329	-7.0	79.4	78.5	-0.9
				11539	11288	-2.2			
25	3.71	4.06	9.3	11111	10271	-7.6	79.0	78.3	-0.7
				11570	11360	-1.8			
26	3.70	3.70	0.0	11148	10920	-2.0	78.8	78.0	-0.8
				11572	11302	-2.3			
27	3.66	3.66	-0.1	11150	10939	-1.9	78.9	78.1	-0.8
				11501	11177	-2.8			
28	3.93	4.02	2.3	10997	10345	-5.9	78.6	77.9	-0.7
				11038	11328	2.6			
29	3.72	3.67	-1.4	11174	10946	-2.0	79.4	78.7	-0.7
				11582	11355	-2.0			
30	3.66	3.63	-0.8	11137	10936	-1.8	79.7	78.5	-1.2
				11489	11271	-1.9			
31	3.65	3.70	1.1	11152	10894	-2.3	79.1	78.7	-0.4
				11491	11310	-1.6			
32	3.63	4.09	12.6	11156	10286	-7.8	79.1	77.6	-1.5
				11540	11204	-2.9			
33	3.65	3.65	0.0	11105	10901	-1.8	78.9	78.0	-0.9
				11501	11229	-2.4			
34	3.64	4.02	10.3	11123	10395	-6.5	79.6	78.6	-1.0
				11501	11295	-1.8			
35	3.66	3.68	0.5	11118	10920	-1.8	78.9	78.2	-0.7
				11416	11283	-1.2			
36	4.24	3.62	-14.6	10550	10896	3.3	79.6	78.1	-1.5
				11455	11370	-0.7			
37	3.65	4.09	12.1	11117	10281	-7.5	79.6	78.2	-1.4
				11491	11359	-1.1			

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG17FNL139	6101.00	2019/1/18	Poppy.Liang	Tim Yi



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38	3.62	4.07	12.4	11148	10423	-6.5	79.4	77.8	-1.6
				11477	11205	-2.4			
39	3.57	3.66	2.5	11132	10834	-2.7	79.3	78.3	-1.0
				11443	11372	-0.6			
40	3.63	3.68	1.3	11065	10873	-1.7	79.9	78.0	-1.9
				11482	11386	-0.8			
41	3.58	3.61	1.0	11068	10787	-2.5	79.8	78.0	-1.8
				11439	11207	-2.0			
42	3.66	4.07	11.2	11103	10287	-7.3	79.1	77.2	-1.9
				11532	11315	-1.9			
43	3.63	3.63	0.0	11093	10891	-1.8	79.9	77.6	-2.3
				11542	11260	-2.4			
44	3.70	3.64	-1.6	11208	10929	-2.5	80.1	77.5	-2.6
				11544	11264	-2.4			
45	3.69	3.62	-1.9	11166	10883	-2.5	79.9	77.8	-2.1
				11468	11112	-3.1			
46	3.62	3.68	1.6	11143	10903	-2.2	78.7	77.2	-1.5
				11557	11405	-1.3			
47	3.67	3.66	-0.3	11115	10957	-1.4	79.1	77.7	-1.4
				11558	11276	-2.4			
48	3.65	3.65	0.0	11150	10965	-1.7	79.4	78.3	-1.1
				11474	11219	-2.2			
49	3.61	3.66	1.2	11108	10868	-2.2	79.0	77.2	-1.8
				11468	11264	-1.8			
50	3.58	3.60	0.7	11112	10819	-2.6	79.3	77.8	-1.5
				11470	11250	-1.9			
51	3.59	3.70	3.0	11173	11007	-1.5	78.5	77.5	-1.0
				11431	11247	-1.6			
52	3.62	3.57	-1.3	11056	10937	-1.1	79.2	77.8	-1.4
				11491	11090	-3.5			
53	3.62	3.69	1.9	11152	10952	-1.8	79.2	78.0	-1.2
				11480	11393	-0.8			
54	3.66	3.62	-0.9	11100	10855	-2.2	79.0	77.9	-1.1
				11556	11342	-1.9			
55	3.64	3.70	1.6	11157	10950	-1.9	79.1	77.6	-1.5
				11590	11377	-1.8			
56	3.68	3.75	1.7	11100	10967	-1.2	78.8	78.2	-0.6
				11494	11303	-1.7			
X-Bar	3.669	3.727	-	11308.8	11038.3	-	79.16	78.04	-
σ	0.092	0.172	-	206.285	295.270	-	0.435	0.400	-

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DG17FNL139	6101.00	2019/1/18	Poppy.Liang	Tim Yi