



# 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>GFC140x140x56.0 mm</b> series as the right table	GFC0412DS-9G28R			
	GFB0412EHS-AL64			
	GFB0412EHS-AL66			
	GFC0412DS-TP01			

**Representative Test P/N :GFC0412DS-F00**

**Equipment: 1.Oven: E24-F0107** On/Off Cycles: Every 500 hours

☉ **L<sub>10</sub> Expectancy: 100,000 hours minimum @ fan rated voltage and the temperature of 40 °C**

According to the equation for **Weibull distribution**, **MTTF ≐ 7×L10 = 700,000 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 Ts (°C) (Actual Test Temperature)	Unstress Temperature Tu (°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 40 °C (hours)	Verified L <sub>10</sub> 40 °C (hours)
70	40	8.00	56	2.303	4,968	8,360.0	1,177,878	168,268

**Test Progress:**

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2007/2/5 3:30 PM	2008/7/6 7:45 AM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	<b>8360.0</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	3,331,541	475,934
30	16.00	2,355,755	336,536
40	8.00	1,177,878	168,268
50	4.00	588,939	84,134
60	2.00	294,469	42,067
70	1.00	147,235	21,034

- 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
DG07FNL019	7432.00	2008/12/24	Nan Yang	Zenny Lei



# 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 GFC140x140x56.0 mm series as the right table

GFC0412DS-9G28R				
GFB0412EHS-AL64				
GFB0412EHS-AL66				
GFC0412DS-TP01				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
4,968	2007/2/5 3:30 PM	2008/7/6 7:45 AM	56	0	<b>8360.0</b>

Representative Test P/N :GFC0412DS-F00	<b>Current Test Status</b>	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination
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Equipment: 1.Oven: E24-F0107 On/Off Cycles: Every 500 hours

### Test Data Between Initial Test and Final Test

Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation
	Current Spec. (A)	Current Spec. (A)		Speed Spec. (RPM)	Speed Spec. (RPM)		Noise Spec. (dB A)	Noise Check. (dB A)	
	<b>1.20 Max.</b>	<b>1.20 Max.</b>		<b>13770-16830</b>	<b>13770-16830</b>		<b>65.0 Max</b>	<b>65.0 Max</b>	<b>3 dBMax.</b>
				<b>10170-12430</b>	<b>10170-12430</b>				
1	1.10	1.02	-7.3	15370	16275	5.9	61.3	63.1	1.8
				10702	11367	6.2			
2	1.10	1.10	0.0	15719	16286	3.6	60.7	62.9	2.2
				10985	11991	9.2			
3	1.12	1.08	-3.6	15352	16052	4.6	60.9	62.6	1.7
				11392	11830	3.8			
4	1.06	1.07	0.9	15379	15906	3.4	61.1	62.8	1.7
				10223	11265	10.2			
5	1.01	1.08	6.9	15274	15492	1.4	60.6	62.7	2.1
				11169	11735	5.1			
6	1.07	1.03	-3.7	15594	15936	2.2	61.4	63.0	1.6
				11021	12040	9.2			
7	1.08	1.04	-3.7	15172	15946	5.1	61.0	62.6	1.6
				11412	11822	3.6			
8	1.06	1.01	-4.7	15099	16135	6.9	60.9	62.8	1.9
				11072	11593	4.7			
9	1.06	1.00	-5.7	15354	16008	4.3	61.2	63.1	1.9
				10788	11505	6.6			
10	1.06	1.03	-2.8	15482	15875	2.5	61.0	62.9	1.9
				11262	11592	2.9			
11	1.09	1.06	-2.8	15241	15633	2.6	60.7	63.0	2.3
				10414	11750	12.8			
12	1.07	1.06	-0.9	15475	15897	2.7	61.4	62.7	1.3
				10787	11785	9.3			
13	1.09	1.05	-3.7	15770	16171	2.5	61.1	63.2	2.1
				10828	11615	7.3			
14	1.11	1.05	-5.4	15561	15797	1.5	60.9	62.8	1.9
				11104	11702	5.4			
15	1.13	1.05	-7.1	15410	16286	5.7	60.6	63.0	2.4
				10446	11534	10.4			
16	1.01	1.05	4.0	15675	15897	1.4	61.4	62.6	1.2
				11024	11520	4.5			
17	1.05	1.01	-3.8	15212	15653	2.9	61.1	62.8	1.7
				11333	11892	4.9			
18	1.06	1.03	-2.8	15501	15980	3.1	60.9	63.1	2.2
				11204	11747	4.8			

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG07FNL019	7432.00	2008/12/24	Nan Yang	Zenny Lei



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	GFB0412EHS-AL64			
	GFB0412EHS-AL66			
	GFC0412DS-TP01			

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
4,968	2007/2/5 3:30 PM	2008/7/6 7:45 AM	56	0	<b>8360.0</b>

Representative Test P/N :GFC0412DS-F00	<b>Current Test Status</b>	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination
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Equipment: 1.Oven: E24-F0107	On/Off Cycles: Every 500 hours
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### Test Data Between Initial Test and Final Test

Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation
	Current Spec. (A)	Current Spec. (A)		Speed Spec. (RPM)	Speed Spec. (RPM)		Noise Spec. (dB A)	Noise Spec. (dB A)	
	<b>1.20 Max.</b>	<b>1.20 Max.</b>		<b>13770-16830</b>	<b>13770-16830</b>		<b>65.0 Max</b>	<b>65.0 Max</b>	<b>3 dBMax.</b>
				<b>10170-12430</b>	<b>10170-12430</b>				
19	0.99	1.04	5.1	15505	16052	3.5	60.7	62.9	2.2
				10424	11750	12.7			
20	1.05	1.05	0.0	15370	15726	2.3	61.3	63.2	1.9
				11161	11685	4.7			
21	1.02	1.02	0.0	14978	15884	6.0	61.0	62.7	1.7
				10818	11581	7.1			
22	1.14	1.11	-2.6	15368	16020	4.2	60.8	63.0	2.2
				11218	11849	5.6			
23	1.10	1.06	-3.6	14847	15906	7.1	61.5	62.6	1.1
				10932	11991	9.7			
24	1.00	1.01	1.0	15387	15569	1.2	61.7	63.1	1.4
				11528	11911	3.3			
25	1.02	1.09	6.9	15546	15840	1.9	61.2	62.8	1.6
				11022	11750	6.6			
26	1.06	1.01	-4.7	15121	15715	3.9	60.9	62.9	2.0
				11132	11833	6.3			
27	1.06	1.01	-4.7	15156	15492	2.2	61.3	63.0	1.7
				10804	11830	9.5			
28	1.03	1.05	1.9	15290	16275	6.4	61.0	62.6	1.6
				10739	11265	4.9			
29	1.06	1.01	-4.7	15037	16066	6.8	61.0	62.7	1.7
				10926	11652	6.6			
30	1.04	1.01	-2.9	15275	15806	3.5	60.9	63.0	2.1
				11098	11595	4.5			
31	1.04	1.08	3.8	15064	16116	7.0	61.4	62.8	1.4
				11293	11958	5.9			
32	1.02	1.01	-1.0	15281	15608	2.1	61.0	63.0	2.0
				10920	11815	8.2			
33	1.07	1.02	-4.7	15221	15532	2.0	60.8	62.9	2.1
				11006	11851	7.7			
34	1.08	1.04	-3.7	15344	15559	1.4	61.4	63.1	1.7
				11313	11855	4.8			
35	1.02	1.09	6.9	15626	16056	2.8	61.0	62.7	1.7
				10634	11613	9.2			
36	1.05	1.04	-1.0	14846	16286	9.7	61.3	63.0	1.7
				11443	11637	1.7			
37	1.15	1.08	-6.1	15244	16052	5.3	60.7	62.6	1.9
				10972	11735	7.0			

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
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### Test Data Between Initial Test and Final Test

Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation
	Current Spec. (A)	Current Spec. (A)		Speed Spec. (RPM)	Speed Spec. (RPM)		Noise Spec. (dB A)	Noise Spec. (dB A)	
	<b>1.20 Max.</b>	<b>1.20 Max.</b>		<b>13770-16830</b>	<b>13770-16830</b>		<b>65.0 Max</b>	<b>65.0 Max</b>	<b>3 dBMax.</b>
				<b>10170-12430</b>	<b>10170-12430</b>				
38	0.98	1.06	8.2	15133	15906	5.1	60.9	62.9	2.0
				11335	12040	6.2			
39	1.05	1.01	-3.8	15106	15842	4.9	61.3	63.1	1.8
				11382	11682	2.6			
40	1.08	1.03	-4.6	15316	15866	3.6	60.6	62.7	2.1
				10973	11747	7.1			
41	1.09	1.10	0.9	15394	16077	4.4	61.2	62.6	1.4
				11467	11578	1.0			
42	1.06	1.04	-1.9	15318	16072	4.9	61.5	62.9	1.4
				11039	11375	3.0			
43	1.03	1.06	2.9	15063	16125	7.1	61.1	63.0	1.9
				10495	11245	7.1			
44	1.08	1.02	-5.6	15312	15879	3.7	61.3	63.2	1.9
				11110	11822	6.4			
45	1.08	1.07	-0.9	15541	15492	-0.3	60.8	62.6	1.8
				10911	11593	6.3			
46	1.11	1.07	-3.6	15881	16020	0.9	61.2	63.1	1.9
				10731	11850	10.4			
47	1.10	1.07	-2.7	15033	15936	6.0	60.9	62.9	2.0
				10770	11998	11.4			
48	1.14	1.04	-8.8	15340	16200	5.6	61.5	62.7	1.2
				10888	11696	7.4			
49	1.12	1.06	-5.4	15244	15916	4.4	61.0	62.8	1.8
				11072	11711	5.8			
50	1.06	1.04	-1.9	15241	15708	3.1	60.7	62.7	2.0
				11425	11930	4.4			
51	1.02	1.01	-1.0	15155	15567	2.7	61.2	63.2	2.0
				11644	11682	0.3			
52	1.03	1.01	-1.9	14635	15604	6.6	61.4	62.9	1.5
				11187	11715	4.7			
53	1.03	1.02	-1.0	15762	16026	1.7	60.9	62.6	1.7
				11039	11619	5.3			
54	1.12	1.09	-2.7	15456	16231	5.0	61.1	63.1	2.0
				10917	11782	7.9			
55	1.10	1.05	-4.5	15138	15832	4.6	61.5	62.7	1.2
				10953	11811	7.8			
56	1.08	1.06	-1.9	15831	15964	0.8	61.0	63.0	2.0
				10759	11486	6.8			
X-Bar	1.066	1.046	-	13166.9	13811.2	-	61.07	62.88	-
$\sigma$	0.039	0.029	-	2182.516	2120.005	-	0.272	0.190	-

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