



# DC FAN LIFE EXPERIMENT REPORT

Available for these models with lower speed and same physical structure. All model may be followed by ARxx or AFxx series suffixes. This test report applies to FFB40x40x28.0 mm series as the right table	FFB0412SHN			
	FFB0412VHN			

<b>Representative Test P/N : FFB0412SHN-AF00</b>	
<b>Equipment: 1. Oven: E24-F0056</b>	On/Off Cycles: Every 500 hours

⊙ **L<sub>10</sub> Expectancy: 70,000 hours minimum @ fan rated voltage and the temperature of 40 °C**  
 According to the equation for **Weibull distribution**, **MTTF ≐ 7×L<sub>10</sub> = 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<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%), and

Stress/Elevated Temperature Ts (°C)	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	150	2.303	1,419	7,491.0	2,587,174	369,596

### Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2007/6/20 3:00 PM	2008/5/29 11:45 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	7491.0

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' 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	7,317,632	1,045,376
30	16.00	5,174,347	739,192
40	8.00	2,587,174	369,596
50	4.00	1,293,587	184,798
60	2.00	646,793	92,399
70	1.00	323,397	46,200

- 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.

<b>Test Result</b>	<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
DG07FNL130	6846.00	2009/2/10	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 ARxx or AFxx series suffixes. This test report applies to FFB40x40x28.0 mm series as the right table

FFB0412SHN				
FFB0412VHN				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
1,419	2007/6/20 3:00 PM	2008/5/29 11:45 PM	150	0	<b>7491.0</b>

Representative Test P/N : FFB0412SHN-AF00	<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-F0056 On/Off Cycles: Every 500 hours

### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (mA) <b>800 Max.</b>	Final Test Current Spec. (mA) <b>800 Max.</b>	Deviation (%)	Initial Test Speed Spec. (RPM) <b>11960-14040</b>	Final Test Speed Spec. (RPM) <b>11960-14040</b>	Deviation (%)	Initial Test Noise Spec. (dB A) <b>56.5 Max</b>	Final Test Noise Spec. (dB A) <b>56.5 Max</b>	Deviation <b>3 dBMax.</b>
1	276	297	7.6	12959	13029	0.5	51.0	51.7	0.7
2	288	300	4.2	12616	13077	3.7	50.3	51.4	1.1
3	317	326	2.8	12801	12922	0.9	50.4	51.1	0.7
4	274	282	2.9	12249	12991	6.1	50.2	50.8	0.6
5	327	328	0.3	12550	12842	2.3	50.6	51.3	0.7
6	271	284	4.8	12589	12738	1.2	50.8	51.5	0.7
7	334	338	1.2	12558	12902	2.7	51.2	51.0	-0.2
8	341	332	-2.6	12797	12865	0.5	50.7	51.3	0.6
9	279	288	3.2	13314	12942	-2.8	50.6	51.2	0.6
10	324	305	-5.9	13118	13037	-0.6	50.8	51.4	0.6
11	276	288	4.3	12531	12855	2.6	51.2	51.7	0.5
12	248	267	7.7	12118	13109	8.2	51.0	51.2	0.2
13	352	370	5.1	12640	13006	2.9	50.8	50.8	0.0
14	292	313	7.2	12462	12892	3.5	51.2	51.3	0.1
15	350	342	-2.3	13168	13087	-0.6	51.4	50.9	-0.5
16	300	324	8.0	12816	12958	1.1	50.6	51.4	0.8
17	330	335	1.5	12665	13068	3.2	50.9	51.2	0.3
18	268	295	10.1	12960	12793	-1.3	50.3	51.6	1.3
19	347	365	5.2	12587	13136	4.4	50.0	50.9	0.9
20	296	319	7.8	12922	13022	0.8	50.4	51.3	0.9
21	337	356	5.6	12793	12988	1.5	50.8	51.1	0.3
22	285	313	9.8	12768	13019	2.0	50.2	50.8	0.6
23	321	334	4.0	12882	12843	-0.3	51.2	51.2	0.0
24	277	308	11.2	12468	13013	4.4	51.0	51.4	0.4
25	336	343	2.1	13564	13147	-3.1	50.0	50.9	0.9
26	265	295	11.3	12574	13027	3.6	50.8	51.5	0.7
27	309	336	8.7	13346	12980	-2.7	51.2	50.8	-0.4
28	246	271	10.2	12578	12714	1.1	51.4	51.3	-0.1
29	361	335	-7.2	12602	12894	2.3	50.9	51.2	0.3
30	287	320	11.5	12730	13041	2.4	50.5	51.5	1.0

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG07FNL130	6846.00	2009/2/10	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 ARxx or AFxx series suffixes. This test report applies to FFB40x40x28.0 mm series as the right table	FFB0412SHN				
	FFB0412VHN				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
1,419	2007/6/20 3:00 PM	2008/5/29 11:45 PM	150	0	<b>7491.0</b>

Representative Test P/N : FFB0412SHN-AF00	<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-F0056	On/Off Cycles: Every 500 hours
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### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec.	Final Test Current Spec.	Deviation (%)	Initial Test Speed Spec.	Final Test Speed Spec.	Deviation (%)	Initial Test Noise Spec.	Final Test Noise Spec.	Deviation 3 dBMax.
	( mA ) <b>800 Max.</b>	( mA ) <b>800 Max.</b>		( RPM ) <b>11960-14040</b>	( RPM ) <b>11960-14040</b>		( dB A ) <b>56.5 Max</b>	( dB A ) <b>56.5 Max</b>	
31	271	302	11.4	12440	13041	4.8	51.2	51.3	0.1
32	350	338	-3.4	12910	12973	0.5	50.8	51.0	0.2
33	287	316	10.1	12851	13074	1.7	50.7	50.8	0.1
34	333	359	7.8	12936	13029	0.7	51.5	51.3	-0.2
35	305	332	8.9	12541	13027	3.9	51.2	51.1	-0.1
36	265	291	9.8	12300	13072	6.3	50.6	51.5	0.9
37	348	338	-2.9	12577	12737	1.3	50.4	50.9	0.5
38	281	311	10.7	12746	12748	0.0	50.2	51.7	1.5
39	345	347	0.6	12621	12871	2.0	50.6	51.4	0.8
40	334	336	0.6	12404	12999	4.8	50.7	51.6	0.9
41	304	331	8.9	12895	12923	0.2	50.8	51.3	0.5
42	354	368	4.0	12892	13182	2.2	50.2	50.8	0.6
43	280	313	11.8	12346	12972	5.1	51.2	51.2	0.0
44	345	332	-3.8	12419	12939	4.2	51.0	51.3	0.3
45	293	321	9.6	12596	12936	2.7	50.6	51.2	0.6
46	349	332	-4.9	12821	12908	0.7	50.3	50.9	0.6
47	277	311	12.3	12862	13041	1.4	50.5	51.6	1.1
48	331	359	8.5	12423	13112	5.5	50.8	51.1	0.3
49	302	332	9.9	12379	12969	4.8	50.4	51.3	0.9
50	313	350	11.8	12624	13069	3.5	51.2	51.5	0.3
51	291	321	10.3	12405	12957	4.4	51.8	51.3	-0.5
52	340	347	2.1	12564	12964	3.2	51.0	51.2	0.2
53	325	346	6.5	12732	13015	2.2	50.7	51.5	0.8
54	254	285	12.2	12791	12885	0.7	50.6	51.1	0.5
55	355	338	-4.8	12942	12894	-0.4	50.7	51.3	0.6
56	277	307	10.8	12294	12807	4.2	51.2	51.0	-0.2
57	285	308	8.1	12093	12960	7.2	50.7	51.6	0.9
58	366	363	-0.8	12747	13115	2.9	50.8	51.3	0.5
59	296	324	9.5	12594	12975	3.0	51.5	51.0	-0.5
60	328	335	2.1	12858	12863	0.0	51.0	51.2	0.2

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG07FNL130	6846.00	2009/2/10	Nan Yang	Zenny Lei



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	FFB0412VHN				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
1,419	2007/6/20 3:00 PM	2008/5/29 11:45 PM	150	0	<b>7491.0</b>

Representative Test P/N : FFB0412SHN-AF00	<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-F0056	On/Off Cycles: Every 500 hours
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### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec.	Final Test Current Spec.	Deviation (%)	Initial Test Speed Spec.	Final Test Speed Spec.	Deviation (%)	Initial Test Noise Spec.	Final Test Noise Spec.	Deviation 3 dBMax.
	( mA ) <b>800 Max.</b>	( mA ) <b>800 Max.</b>		( RPM ) <b>11960-14040</b>	( RPM ) <b>11960-14040</b>		( dB A ) <b>56.5 Max</b>	( dB A ) <b>56.5 Max</b>	
61	280	313	11.8	12787	12959	1.3	50.6	51.5	0.9
62	281	315	12.1	12502	12854	2.8	51.4	51.1	-0.3
63	334	309	-7.5	12907	12757	-1.2	50.2	51.0	0.8
64	263	297	12.9	12464	12947	3.9	50.7	51.5	0.8
65	344	336	-2.3	12356	13037	5.5	51.5	51.3	-0.2
66	277	304	9.7	12514	12856	2.7	51.0	50.8	-0.2
67	330	336	1.8	12282	12981	5.7	50.6	51.1	0.5
68	272	303	11.4	12403	12860	3.7	50.3	51.5	1.2
69	323	320	-0.9	13069	12794	-2.1	50.1	51.2	1.1
70	303	322	6.3	12710	12994	2.2	50.2	51.7	1.5
71	343	337	-1.7	12441	12793	2.8	50.4	51.3	0.9
72	274	303	10.6	12623	12858	1.9	50.5	50.9	0.4
73	346	325	-6.1	12678	12960	2.2	50.0	51.4	1.4
74	290	322	11.0	12818	13041	1.7	50.7	51.0	0.3
75	340	333	-2.1	12538	12927	3.1	50.5	51.7	1.2
76	295	312	5.8	13171	12966	-1.6	50.2	51.1	0.9
77	350	335	-4.3	12647	12970	2.6	50.6	50.8	0.2
78	295	306	3.7	12393	12981	4.7	50.3	51.2	0.9
79	351	314	-10.5	12199	12641	3.6	50.5	51.0	0.5
80	304	315	3.6	12403	12897	4.0	50.4	51.3	0.9
81	286	311	8.7	12477	12956	3.8	51.0	51.1	0.1
82	357	368	3.1	12467	13183	5.7	51.1	51.6	0.5
83	305	314	3.0	12773	12896	1.0	50.7	51.4	0.7
84	264	289	9.5	12621	13207	4.6	50.6	51.0	0.4
85	339	329	-2.9	12771	12783	0.1	50.3	51.2	0.9
86	283	307	8.5	12549	13248	5.6	50.7	51.7	1.0
87	334	325	-2.7	12620	12951	2.6	51.0	51.0	0.0
88	287	306	6.6	12397	12995	4.8	50.6	51.3	0.7
89	341	332	-2.6	12536	13015	3.8	50.8	51.6	0.8
90	267	292	9.4	12960	12986	0.2	51.0	50.9	-0.1

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG07FNL130	6846.00	2009/2/10	Nan Yang	Zenny Lei



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	FFB0412VHN				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
1,419	2007/6/20 3:00 PM	2008/5/29 11:45 PM	150	0	<b>7491.0</b>

Representative Test P/N : FFB0412SHN-AF00	<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-F0056	On/Off Cycles: Every 500 hours
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### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec.	Final Test Current Spec.	Deviation (%)	Initial Test Speed Spec.	Final Test Speed Spec.	Deviation (%)	Initial Test Noise Spec.	Final Test Noise Spec.	Deviation 3 dBMax.
	( mA ) <b>800 Max.</b>	( mA ) <b>800 Max.</b>		( RPM ) <b>11960-14040</b>	( RPM ) <b>11960-14040</b>		( dB A ) <b>56.5 Max</b>	( dB A ) <b>56.5 Max</b>	
91	341	310	-9.1	12616	12730	0.9	50.6	51.6	1.0
92	288	316	9.7	12248	12948	5.7	51.0	51.1	0.1
93	341	359	5.3	12561	12898	2.7	50.3	51.2	0.9
94	290	305	5.2	12742	12886	1.1	50.2	51.5	1.3
95	326	332	1.8	12662	12862	1.6	50.4	51.7	1.3
96	279	312	11.8	12670	12947	2.2	51.0	51.4	0.4
97	332	341	2.7	12747	12976	1.8	50.7	51.1	0.4
98	278	300	7.9	12198	13052	7.0	50.8	51.3	0.5
99	331	352	6.3	12204	12984	6.4	50.4	51.7	1.3
100	290	319	10.0	12513	12933	3.4	51.5	51.4	-0.1
101	329	361	9.7	13004	12928	-0.6	51.0	51.2	0.2
102	278	304	9.4	12564	12871	2.4	50.8	51.6	0.8
103	314	313	-0.3	12647	12795	1.2	50.6	51.5	0.9
104	293	309	5.5	12268	12774	4.1	51.0	51.3	0.3
105	330	342	3.6	12700	12944	1.9	50.8	51.3	0.5
106	287	316	10.1	12589	12850	2.1	50.3	51.7	1.4
107	320	330	3.1	12850	12958	0.8	50.1	51.5	1.4
108	343	332	-3.2	13070	12902	-1.3	50.3	51.1	0.8
109	285	320	12.3	12321	12889	4.6	50.8	51.6	0.8
110	330	337	2.1	12765	12771	0.0	50.5	51.2	0.7
111	300	322	7.3	12496	12741	2.0	51.0	51.4	0.4
112	343	337	-1.7	12897	12655	-1.9	51.0	51.1	0.1
113	284	302	6.3	12279	12982	5.7	50.5	51.3	0.8
114	324	337	4.0	12709	12945	1.9	50.8	51.7	1.0
115	274	307	12.0	12547	12764	1.7	50.3	51.5	1.2
116	346	320	-7.5	13122	12835	-2.2	50.0	51.2	1.2
117	290	310	6.9	12217	12679	3.8	50.4	51.3	0.9
118	339	342	0.9	12123	12798	5.6	50.3	50.8	0.5
119	301	319	6.0	12373	12994	5.0	50.5	51.7	1.2
120	354	342	-3.4	12444	13152	5.7	50.5	51.3	0.8

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
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	FFB0412VHN				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
1,419	2007/6/20 3:00 PM	2008/5/29 11:45 PM	150	0	<b>7491.0</b>
Representative Test P/N : FFB0412SHN-AF00			<b>Current Test Status</b>		<input type="checkbox"/> In process <input type="checkbox"/> In process (exceed requested) <input checked="" type="checkbox"/> Termination

Equipment: 1. Oven: E24-F0056	On/Off Cycles: Every 500 hours
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### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (mA) <b>800 Max.</b>	Final Test Current Spec. (mA) <b>800 Max.</b>	Deviation (%)	Initial Test Speed Spec. (RPM) <b>11960-14040</b>	Final Test Speed Spec. (RPM) <b>11960-14040</b>	Deviation (%)	Initial Test Noise Spec. (dB A) <b>56.5 Max</b>	Final Test Noise Spec. (dB A) <b>56.5 Max</b>	Deviation <b>3 dBMax.</b>
121	280	304	8.6	12263	12896	5.2	51.0	51.0	0.0
122	329	362	10.0	12741	13055	2.5	50.2	50.9	0.7
123	308	331	7.5	12214	12983	6.3	50.6	51.4	0.8
124	339	335	-1.2	12492	12980	3.9	50.3	51.2	0.9
125	341	338	-0.9	12976	12777	-1.5	50.4	51.1	0.7
126	288	308	6.9	12366	13028	5.4	50.2	51.3	1.1
127	352	348	-1.1	12294	12841	4.4	50.7	51.5	0.8
128	299	309	3.3	12124	12869	6.1	50.5	51.2	0.7
129	350	353	0.9	12599	13062	3.7	50.8	51.4	0.6
130	296	319	7.8	12047	12911	7.2	50.2	51.6	1.4
131	360	341	-5.3	12751	12905	1.2	50.5	51.3	0.8
132	297	322	8.4	12636	12943	2.4	50.3	51.7	1.4
133	349	358	2.6	12853	13185	2.6	50.4	51.1	0.7
134	305	331	8.5	12368	12893	4.2	50.5	50.9	0.4
135	331	343	3.6	12747	12765	0.1	51.0	51.0	0.0
136	304	342	12.5	12249	12904	5.3	50.5	51.2	0.7
137	328	337	2.7	12120	12923	6.6	51.1	51.4	0.3
138	324	345	6.5	12891	13000	0.8	51.0	50.8	-0.2
139	292	322	10.3	12320	13108	6.4	50.3	51.2	0.9
140	295	323	9.5	12290	13010	5.9	50.0	51.5	1.5
141	345	338	-2.0	12892	12894	0.0	50.7	51.3	0.6
142	282	313	11.0	12239	13104	7.1	50.3	51.0	0.7
143	346	334	-3.5	11971	12915	7.9	50.6	51.5	0.9
144	305	326	6.9	12197	12913	5.9	50.7	51.3	0.6
145	329	314	-4.6	12220	12672	3.7	51.0	51.2	0.2
146	286	323	12.9	12959	12729	-1.8	51.1	51.5	0.4
147	288	301	4.5	12616	12671	0.4	50.8	51.6	0.8
148	317	342	7.9	12801	13130	2.6	50.6	50.9	0.3
149	287	318	10.8	12249	12939	5.6	51.5	51.2	-0.3
150	327	344	5.2	12550	13078	4.2	51.0	51.5	0.5
X-Bar	310.3	323.8	-	12612.0	12953.1	-	50.70	51.24	-
$\sigma$	30.256	21.164	-	287.307	118.572	-	0.383	0.253	-

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG07FNL130	6846.00	2009/2/10	Nan Yang	Zenny Lei