



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 FFB 40x40x28.0 mm series as the right table	FFB0412UHN-SP4Z				

Representative Test P/N : FFB0412UHN-BC2E	
Equipment: 1.Oven: E24-T0161	On/Off Cycles: Every 500 hours

◎ **L₁₀ Expectancy: 11,200 hours minimum @ fan rated voltage and the temperature of 70°C**
 According to the equation for **Weibull distribution**, **MTTF ≅ 7×L10 = 78,400 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,

$$t = 1.036 \times MTTF \times [(B_{r;c}) \div n]^{0.91} \div A_F, \text{ and } A_F = 2^{(T_s - T_u)/10}$$

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 Ts (°C) <small>(Actual Test Temperature)</small>	Unstress Temperature Tu (°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 70 °C (hours)	Verified L ₁₀ 70 °C (hours)
75	70	1.41	56	2.303	3,148	15,360.0	382,569	54,653

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2012/7/26 10:00 AM	2014/5/12 9:13 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	15360.0

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	32.00	8,656,554	1,236,651
30	22.63	6,121,108	874,444
40	11.31	3,060,554	437,222
50	5.66	1,530,277	218,611
60	2.83	765,139	109,306
70	1.41	382,569	54,653
75	1.00	270,517	38,645

- 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"/> Accept <input type="checkbox"/> Reject
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QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG12FNL091	12583.50	2015/11/10	NaNa.Wang	Tim.Yi



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,148	2012/7/26 10:00 AM	2014/5/12 9:13 PM	56	0	15360.0
Representative Test P/N : FFB0412UHN-BC2E			Current Test Status		<input type="checkbox"/> In process <input type="checkbox"/> In process (exceed requested) <input checked="" type="checkbox"/> Termination

Equipment: 1.Oven: E24-T0161 On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test									
Sample No.	Initial Test Current Spec. (mA) 1010 Max.	Final Test Current Spec. (mA) 1010 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 21160-24840	Final Test Speed Spec. (RPM) 21160-24840	Deviation (%)	Initial Test Noise Spec. (dB A) 63.9 Max	Final Test Noise Spec. (dB A) 63.9 Max	Deviation 3 dBMax.
1	891	837	-6.1	22533	22777	1.1	58.0	59.3	1.3
2	876	825	-5.8	22872	23144	1.2	58.2	58.6	0.4
3	876	838	-4.3	23001	23000	0.0	58.5	59.2	0.7
4	913	828	-9.3	22985	22940	-0.2	58.9	58.8	-0.1
5	876	790	-9.8	22835	22810	-0.1	58.1	58.6	0.5
6	898	787	-12.4	22013	21667	-1.6	58.7	59.4	0.7
7	876	842	-3.9	22386	23084	3.1	58.3	58.9	0.6
8	841	851	1.2	22736	23243	2.2	58.5	59.6	1.1
9	855	817	-4.4	22959	22798	-0.7	58.7	59.2	0.5
10	897	827	-7.8	22564	22861	1.3	58.6	59.4	0.8
11	889	818	-8.0	23187	22879	-1.3	58.5	59.6	1.1
12	881	797	-9.5	22799	23077	1.2	58.7	58.6	-0.1
13	887	818	-7.8	23189	23106	-0.4	58.2	59.0	0.8
14	880	812	-7.7	22791	23088	1.3	58.6	59.2	0.6
15	886	835	-5.8	22840	22891	0.2	58.7	59.4	0.7
16	845	777	-8.0	22952	22599	-1.5	58.2	58.8	0.6
17	878	814	-7.3	23141	22956	-0.8	58.2	59.6	1.4
18	847	889	5.0	22014	23084	4.9	58.7	58.7	0.0
19	854	833	-2.5	22875	22912	0.2	58.3	59.2	0.9
20	821	839	2.2	22535	23082	2.4	58.5	59.4	0.9
21	837	834	-0.4	22675	22001	-3.0	58.9	58.9	0.0
22	900	809	-10.1	22879	22803	-0.3	58.7	58.6	-0.1
23	878	860	-2.1	22934	22792	-0.6	58.6	59.1	0.5
24	872	831	-4.7	22809	23184	1.6	58.5	59.3	0.8
25	906	824	-9.1	22709	23050	1.5	58.3	58.8	0.5
26	878	807	-8.1	22830	23000	0.7	58.2	59.5	1.3
27	882	819	-7.1	23150	22977	-0.7	58.7	58.7	0.0
28	883	818	-7.4	22674	23074	1.8	58.3	58.7	0.4
29	881	907	3.0	22979	23211	1.0	58.7	59.0	0.3
30	865	822	-5.0	22516	22699	0.8	58.3	58.5	0.2
31	822	863	5.0	22879	22978	0.4	58.5	58.9	0.4
32	882	822	-6.8	22769	23026	1.1	58.2	58.7	0.5

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG12FNL091	12583.50	2015/11/10	NaNa.Wang	Tim.Yi



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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FFB0412UHN-SP4Z				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,148	2012/7/26 10:00 AM	2014/5/12 9:13 PM	56	0	15360.0

Representative Test P/N : FFB0412UHN-BC2E	Current Test Status	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination
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Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (mA) 1010 Max.	Final Test Current Spec. (mA) 1010 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 21160-24840	Final Test Speed Spec. (RPM) 21160-24840	Deviation (%)	Initial Test Noise Spec. (dB A) 63.9 Max	Final Test Noise Spec. (dB A) 63.9 Max	Deviation 3 dBMax.
33	830	867	4.5	22727	23044	1.4	58.6	59.0	0.4
34	839	827	-1.4	22443	23290	3.8	58.2	58.8	0.6
35	850	822	-3.3	23036	22819	-0.9	58.7	59.1	0.4
36	883	800	-9.4	23021	23116	0.4	58.3	59.3	1.0
37	903	851	-5.8	23081	23071	0.0	58.1	58.7	0.6
38	846	838	-0.9	22529	22603	0.3	58.7	59.1	0.4
39	831	824	-0.8	22976	22792	-0.8	58.3	59.3	1.0
40	831	845	1.7	22953	22609	-1.5	58.5	59.5	1.0
41	864	852	-1.4	22878	23235	1.6	58.1	58.9	0.8
42	845	841	-0.5	22552	22877	1.4	58.7	58.6	-0.1
43	882	844	-4.3	22665	22490	-0.8	58.3	59.1	0.8
44	884	840	-5.0	22696	22796	0.4	58.5	58.8	0.3
45	860	862	0.2	22645	22585	-0.3	58.6	59.3	0.7
46	913	874	-4.3	22813	23184	1.6	58.7	59.5	0.8
47	919	846	-7.9	23155	22528	-2.7	58.3	59.6	1.3
48	908	868	-4.4	22057	23100	4.7	58.5	58.7	0.2
49	872	824	-5.5	22648	22555	-0.4	58.2	59.0	0.8
50	870	873	0.3	22230	23199	4.4	58.5	59.4	0.9
51	849	832	-2.0	22724	22617	-0.5	58.7	58.9	0.2
52	887	871	-1.8	22707	23215	2.2	58.1	59.6	1.5
53	875	829	-5.3	23030	22669	-1.6	58.6	58.6	0.0
54	861	827	-3.9	22686	22581	-0.5	58.3	59.0	0.7
55	913	873	-4.4	23208	23191	-0.1	58.6	59.1	0.5
56	884	873	-1.2	22988	23068	0.3	58.7	59.2	0.5
X-Bar	872.4	835.6	-	22776.0	22893.3	-	58.46	59.1	-
σ	24.696	25.672	-	280.010	299.374	-	0.229	0.326	-

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DG12FNL091	12583.50	2015/11/10	NaNa.Wang	Tim.Yi