



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 or BRxx or BFxx series suffixes. This test report applies to FFB 40x40x28 mm series as the right table	FFB0412VHN	FFB0412HHN	FFB0412HN	FFB0412MN	FFB0412VHN-TP03
	FFB0424VHN	FFB0424HHN	FFB0424HN	FFB0424MN	

Representative Test P/N : FFB0412VHN-F00

Instruments used: 1. Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D 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 \cong 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%), and

Stress/Elevated Temperature T _s (°C)	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 (hours)	Verified L ₁₀ (hours)
70	40	8.00	60	2.303	3,266	4,024.0	603,696	86,242

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2002/1/11 8:00 AM	2002/7/5 11:08 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	4024.0

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	1,707,510	243,930
30	16.00	1,207,392	172,485
40	8.00	603,696	86,242
50	4.00	301,848	43,121
60	2.00	150,924	21,561
70	1.00	75,462	10,780
Test Result			<input checked="" type="checkbox"/> Accept <input type="checkbox"/> Reject

Fan permission criteria for the measurement after test :

1. For current, the limit is less than spec.(max.).
2. For speed, the allowable decrease is less than 15%.
3. For noise, the limit is less than spec.(max.). + 3 dB

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
QE-020081-DET	949.00	2002/8/6 1:00 PM	AMNUAY.B	



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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	FFB0424VHN	FFB0424HHN	FFB0424HN	FFB0424MN	

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,266	2002/1/11 8:00 AM	2002/7/5 11:08 PM	60	0	4024.0

Representative Test P/NFFB0412VHN-F00	Current Test Status	<input type="checkbox"/>	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination
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Instruments used: 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample P/N : 720-0595-01

Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)
	Current Spec. (A) 0.19 Max.	Current Spec. (A) 0.19 Max.		Speed Spec. (RPM) 9500 Ref.	Speed Spec. (RPM) 9500-15%		Noise Spec. (dB A) 45.9 Max.	Noise Spec. (dB A) 49.9 Max.	
1	0.16	0.18	12.5	9317	9922	6.5	38.3	39.7	3.7
2	0.16	0.18	12.5	9206	9749	5.9	38.0	39.3	3.4
3	0.16	0.18	12.5	9199	9972	8.4	38.0	39.8	4.7
4	0.17	0.19	11.8	9242	9783	5.9	38.1	39.4	3.4
5	0.16	0.18	12.5	9130	9728	6.5	37.9	39.2	3.4
6	0.16	0.18	12.5	9189	9757	6.2	38.0	39.3	3.4
7	0.17	0.18	5.9	9262	9888	6.8	38.2	39.6	3.7
8	0.16	0.19	18.8	9324	8743	-6.2	38.3	36.9	-3.7
9	0.16	0.19	18.8	9216	9942	7.9	38.1	39.7	4.2
10	0.17	0.19	11.8	9203	9777	6.2	38.0	39.3	3.4
11	0.16	0.18	12.5	9175	9982	8.8	38.0	39.8	4.7
12	0.16	0.18	12.5	9184	9757	6.2	38.0	39.3	3.4
13	0.16	0.19	18.8	9312	9858	5.9	38.3	39.5	3.1
14	0.16	0.19	18.8	9116	9710	6.5	37.8	39.2	3.7
15	0.16	0.19	18.8	9198	9790	6.4	38.0	39.4	3.7
16	0.17	0.18	5.9	9312	9226	-0.9	38.3	38.1	-0.5
17	0.16	0.18	12.5	9388	9608	2.3	38.5	39.0	1.3
18	0.17	0.19	11.8	9296	9948	7.0	38.2	39.7	3.9
19	0.16	0.19	18.8	9188	9720	5.8	38.0	39.2	3.2
20	0.16	0.18	12.5	9132	9757	6.8	37.9	39.3	3.7
21	0.17	0.18	5.9	9236	9858	6.7	38.1	39.5	3.7
22	0.17	0.18	5.9	9218	9820	6.5	38.1	39.4	3.4
23	0.17	0.18	5.9	9216	9779	6.1	38.1	39.3	3.1
24	0.16	0.19	18.8	9188	10118	10.1	38.0	40.1	5.5
25	0.16	0.18	12.5	9192	9840	7.0	38.0	39.5	3.9
26	0.16	0.18	12.5	9229	9882	7.1	38.1	39.6	3.9
27	0.16	0.18	12.5	9302	9728	4.6	38.3	39.4	2.9
28	0.16	0.18	12.5	9316	10072	8.1	38.3	40.0	4.4
29	0.16	0.18	12.5	9188	9810	6.8	38.0	39.4	3.7
30	0.17	0.18	5.9	9202	9639	4.7	38.0	39.0	2.6
31	0.17	0.18	5.9	9289	9640	3.8	38.2	39.0	2.1
32	0.16	0.19	18.8	9161	9734	6.3	37.9	39.2	3.4
33	0.16	0.18	12.5	9183	9734	6.0	38.0	39.2	3.2
34	0.16	0.19	18.8	9142	9716	6.3	37.9	39.2	3.4
35	0.17	0.18	5.9	9244	9800	6.0	38.1	39.4	3.4



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36	0.16	0.19	18.8	9332	9543	2.3	38.3	38.8	1.3
37	0.17	0.18	5.9	9245	9956	7.7	38.1	39.7	4.2
38	0.16	0.18	12.5	9189	9806	6.7	38.0	39.4	3.7
39	0.16	0.18	12.5	9288	9724	4.7	38.2	39.2	2.6
40	0.17	0.18	5.9	9320	9686	3.9	38.3	39.1	2.1
41	0.17	0.18	5.9	9197	9816	6.7	38.0	39.4	3.7
42	0.16	0.18	12.5	9169	9800	6.9	37.9	39.4	4.0
43	0.17	0.19	11.8	9204	9776	6.2	38.0	39.3	3.4
44	0.17	0.18	5.9	9232	9760	5.7	38.1	39.3	3.1
45	0.17	0.18	5.9	9208	9630	4.6	38.0	39.0	2.6
46	0.17	0.18	5.9	9220	9932	7.7	38.1	39.7	4.2
47	0.16	0.18	12.5	9198	10025	9.0	38.0	39.9	5.0
48	0.16	0.17	6.3	9194	9918	7.9	38.0	39.7	4.5
49	0.16	0.18	12.5	9495	9768	2.9	38.0	39.3	3.4
50	0.17	0.19	11.8	9276	9763	5.3	38.2	39.3	2.9
51	0.17	0.18	5.9	9269	9918	7.0	38.2	39.7	3.9
52	0.16	0.18	12.5	9304	9612	3.3	38.3	39.0	1.8
53	0.16	0.18	12.5	9290	9720	4.6	38.2	39.2	2.6
54	0.17	0.18	5.9	9282	9922	6.9	38.2	39.7	3.9
55	0.16	0.18	12.5	9199	9972	8.4	38.0	39.8	4.7
56	0.16	0.18	12.5	9189	9922	8.0	38.0	39.7	4.5
57	0.16	0.19	18.8	9248	10108	9.3	38.1	40.1	5.2
58	0.17	0.18	5.9	9232	10022	8.6	38.1	39.9	4.7
59	0.16	0.19	18.8	9188	9830	7.0	38.0	39.5	3.9
60	0.16	0.19	18.8	9185	9772	6.4	38.0	39.3	3.4
X-Bar	0.16	0.18	-	9234.13	9791.47	-	38.09	39.37	-
σ	0.01	0.01	-	134.64	373.33	-	0.27	0.87	-

QE File No.	Time-out for function test or others (hrs)	Issued Date	Reported By	Approved By
QE-020081-DET	949.00	2002/8/6 1:00 PM	AMNUAY.B	