

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 PFB 120x120x38.0mm series as the right table				
Representative Test P/N : PFB1224SE-00P0				
Equipment: 1.Oven: E24-T0161				

◎ **L₁₀ Expectancy: 70,000 hours minimum @ fan rated voltage and the temperature of 40°C**
 According to the equation for **Weibull distribution**, $MTTF \cong 7 \times L_{10} = 490,000$ 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,

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

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)
85	40	22.63	29	2.303	2,238	6,360.0	1,392,602	198,943

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2020/5/6 8:10 AM	2020/9/3 1:50 AM	<input type="checkbox"/> In process	<input checked="" type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination	6360.0

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	64.00	3,938,873	562,696
30	45.25	2,785,204	397,886
40	22.63	1,392,602	198,943
50	11.31	696,301	99,472
60	5.66	348,151	49,736
70	2.83	174,075	24,868
80	1.41	87,038	12,434
85	1.00	61,545	8,792

- Fan permission criteria for the measurement after test :
1. Speed can not drop of $\geq 15\%$ below the original measured rpm.
 2. Current cannot increase $> 15\%$ of original measure current.
 3. Noise cannot $> 3\text{dB}$ 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
DG20FNL026	4503.83	2021/8/2	Loly.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)
2,238	2020/5/6 8:10 AM	2020/9/3 1:50 AM	29	0	6360.0
Representative Test P/N : PFB1224SE-00P0			Current Test Status		<input type="checkbox"/> In process <input checked="" type="checkbox"/> In process (exceed requested) <input type="checkbox"/> Termination

Equipment: 1.Oven: E24-T0161

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
	2.30 Max.	2.30 Max.		6750-8250	6750-8250		74.0 Max	74.0 Max	
1	2.25	2.14	-4.6	7732	7969	3.1	70.2	69.5	-0.7
2	2.17	2.14	-1.7	7753	7898	1.9	69.5	69.9	0.4
3	2.21	2.13	-3.7	7538	7804	3.5	69.1	70.3	1.2
4	2.22	2.14	-3.7	7772	7956	2.4	69.7	70.9	1.2
5	2.14	2.13	-0.6	7575	7819	3.2	69.2	69.6	0.4
6	2.14	2.14	-0.3	7785	7878	1.2	70.1	70.1	0.0
7	2.18	2.13	-2.0	7686	7837	2.0	69.1	69.5	0.4
8	2.19	2.13	-2.7	7604	7865	3.4	69.0	70.4	1.4
9	2.22	2.14	-3.7	7728	7872	1.9	69.3	70.2	0.9
10	2.21	2.14	-3.3	7615	7901	3.8	68.9	70.1	1.2
11	2.30	2.14	-6.7	7766	7929	2.1	70.3	71.0	0.7
12	2.27	2.14	-5.9	7777	7918	1.8	70.0	71.3	1.3
13	2.20	2.14	-2.9	7620	7940	4.2	69.6	70.0	0.4
14	2.13	2.13	0.0	7719	7857	1.8	69.5	69.9	0.4
15	2.19	2.13	-2.3	7588	7867	3.7	69.1	69.6	0.5
16	2.14	2.12	-0.9	7699	7758	0.8	69.3	69.7	0.4
17	2.10	2.13	1.9	7744	7859	1.5	69.9	70.0	0.1
18	2.14	2.13	-0.8	7649	7812	2.1	69.7	69.6	-0.1
19	2.23	2.13	-4.3	7827	7797	-0.4	69.1	69.5	0.4
20	2.22	2.13	-3.8	7783	7932	1.9	70.0	70.2	0.2
21	2.19	2.14	-2.2	7724	7915	2.5	69.6	69.9	0.3
22	2.19	2.14	-2.3	7855	7890	0.4	69.8	70.5	0.7
23	2.26	2.14	-5.5	7762	7905	1.8	69.5	70.6	1.1
24	2.16	2.14	-0.9	7752	7984	3.0	70.1	70.3	0.2
25	2.24	2.13	-4.7	7803	7829	0.3	69.6	69.3	-0.3
26	2.26	2.14	-5.4	7831	8012	2.3	69.7	70.4	0.7
27	2.21	2.14	-3.3	7714	7917	2.6	69.9	70.0	0.1
28	2.18	2.13	-2.3	7764	7922	2.0	70.1	69.8	-0.3
29	2.12	2.12	0.0	7642	7764	1.6	69.6	69.9	0.3
X-Bar	2.19	2.13	-	7717.48	7882.97	-	69.60	70.07	-
σ	0.05	0.01	-	82.41	61.31	-	0.38	0.47	-

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DG20FNL026	4503.83	2021/8/2	Loly.Wang	Tim.Yi