



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 PFM 80X80X38mm series as the right table	PFR0848HE-02EM2				

Representative Test P/N : PFM0812HE-03CCA	
Equipment: 1.Oven: E24-T0161	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 ≐ 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%).

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)
70	40	8.00	56	2.303	3,478	2,360.0	332,511	47,502

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2019/5/9 9:00 AM	2020/1/21 1:46 PM	<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination	2360.0

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	940,483	134,355
30	16.00	665,022	95,003
40	8.00	332,511	47,502
50	4.00	166,255	23,751
60	2.00	83,128	11,875
70	1.00	41,564	5,938

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
DG19FNL027	2695.00	2019/12/6	Loly.Wang	Tim.Yi

BGN (dBA) : 16.0

Temp (°C) : 21.0



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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PFR0848HE-02EM2

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2019/5/9 9:00 AM	2020/1/21 1:46 PM	56	0	2360.0

Representative Test P/N :PFM0812HE-03CCA	Current Test Status	<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination
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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. (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
	5.4Max.	5.4Max.		15930-19470	15930-19470		80Max	80Max	
1	4.07	4.17	2.3	16961	16739	-1.3	75.0	74.2	-0.8
2	4.09	4.17	1.8	15915	16866	6.0	74.5	74.6	0.1
3	4.02	4.13	2.6	16279	16710	2.6	74.1	72.8	-1.3
4	4.19	4.12	-1.9	16675	16887	1.3	74.2	73.5	-0.7
5	4.14	4.24	2.3	16609	16829	1.3	75.2	73.8	-1.4
6	4.07	4.14	1.6	16318	16793	2.9	74.7	74.0	-0.7
7	4.13	4.14	0.2	16196	16846	4.0	75.4	74.1	-1.3
8	4.08	4.10	0.6	16782	16750	-0.2	75.1	74.0	-1.1
9	4.31	4.19	-2.8	16223	16855	3.9	75.0	74.5	-0.5
10	4.08	4.11	0.8	16680	16751	0.4	75.3	74.6	-0.7
11	4.12	4.14	0.6	16544	16612	0.4	75.4	74.0	-1.4
12	4.08	4.18	2.3	16237	16673	2.7	74.8	74.0	-0.8
13	4.08	4.12	0.8	16374	16743	2.3	75.0	74.0	-1.0
14	4.36	4.16	-4.5	16910	16815	-0.6	74.7	73.7	-1.0
15	4.15	4.19	0.9	17029	16936	-0.5	75.2	75.6	0.4
16	4.10	4.18	2.1	16909	16842	-0.4	74.2	73.0	-1.2
17	4.10	4.19	2.1	17020	16967	-0.3	74.6	74.0	-0.6
18	4.23	4.27	0.9	16992	16806	-1.1	74.9	73.7	-1.2
19	4.13	4.12	-0.4	16785	16797	0.1	75.0	73.5	-1.5
20	4.06	4.07	0.3	16563	16770	1.2	74.8	74.4	-0.4
21	4.14	4.08	-1.3	16901	16832	-0.4	75.1	73.9	-1.2
22	4.15	4.18	0.7	16999	16827	-1.0	75.4	74.0	-1.4
23	4.12	4.20	2.1	16988	16873	-0.7	75.3	73.4	-1.9
24	4.05	4.07	0.6	16711	16803	0.6	74.7	73.0	-1.7
25	4.36	4.14	-5.2	16931	16829	-0.6	74.5	74.2	-0.3
26	4.09	4.21	3.1	16889	16812	-0.5	74.1	74.2	0.1
27	4.11	4.18	1.7	16947	16736	-1.2	74.9	74.5	-0.4
28	4.25	4.17	-1.8	16992	16873	-0.7	74.7	73.8	-0.9
29	4.19	4.19	0.0	17003	16914	-0.5	74.8	74.0	-0.8
30	4.10	4.08	-0.3	16876	16850	-0.2	74.5	74.0	-0.5
31	4.05	4.19	3.3	16890	16820	-0.4	74.9	74.0	-0.9
32	4.04	4.19	3.7	16909	16809	-0.6	74.3	73.5	-0.8

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG19FNL027	2695.00	2019/12/6	Loly.Wang	Tim.Yi



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 PFM 80X80X38mm series as the right table				PFR0848HE-02EM2					
Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)				
3,478	2019/5/9 9:00 AM	2020/1/21 1:46 PM	56	0	2360.0				
Representative Test P/N :PFM0812HE-03CCA			Current Test Status		<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input 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. (A) 5.4Max.	Final Test Current Spec. (A) 5.4Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 15930-19470	Final Test Speed Spec. (RPM) 15930-19470	Deviation (%)	Initial Test Noise Spec. (dB A) 80Max	Final Test Noise Spec. (dB A) 80Max	Deviation 3 dBMax.
33	4.08	4.17	2.4	16961	16925	-0.2	74.0	73.2	-0.8
34	4.08	4.30	5.5	16955	16816	-0.8	74.1	77.0	2.9
35	4.07	4.10	0.7	16905	16810	-0.6	75.1	73.5	-1.6
36	4.08	4.21	3.1	16825	16835	0.1	74.6	73.8	-0.8
37	4.07	4.16	2.2	16838	16790	-0.3	75.0	74.0	-1.0
38	4.08	4.13	1.4	16894	16713	-1.1	74.5	74.5	0.0
39	4.12	4.13	0.2	16919	16810	-0.6	74.9	73.6	-1.3
40	4.10	4.16	1.4	16917	16906	-0.1	74.8	74.0	-0.8
41	4.10	4.07	-0.8	16967	16865	-0.6	74.9	74.3	-0.6
42	4.14	4.16	0.4	16978	16768	-1.2	75.1	74.0	-1.1
43	4.08	4.07	-0.2	16949	16714	-1.4	74.6	74.2	-0.4
44	4.08	4.14	1.6	16915	16681	-1.4	75.0	73.9	-1.1
45	4.10	4.15	1.2	16873	16884	0.1	74.2	74.0	-0.2
46	4.08	4.13	1.2	16879	16860	-0.1	74.8	73.3	-1.5
47	4.02	4.17	3.7	16919	16732	-1.1	74.0	74.0	0.0
48	4.05	4.08	0.7	16882	16693	-1.1	74.2	73.0	-1.2
49	4.02	4.16	3.3	16877	16800	-0.5	74.3	73.8	-0.5
50	4.08	4.15	1.6	16940	16863	-0.5	74.6	74.2	-0.4
51	4.03	4.21	4.2	16869	16856	-0.1	74.5	73.9	-0.6
52	4.23	4.15	-1.9	16881	16814	-0.4	74.3	74.3	0.0
53	4.31	4.21	-2.3	16936	16936	0.0	74.7	74.8	0.1
54	4.14	4.17	0.8	16986	16702	-1.7	74.6	73.7	-0.9
55	4.03	4.09	1.5	16807	16738	-0.4	74.7	74.2	-0.5
56	4.29	4.22	-1.5	16913	16725	-1.1	75.2	74.0	-1.2
X-Bar	4.12	4.15	-	16800.39	16807.16	-	74.73	73.99	-
σ	0.08	0.05	-	250.17	72.69	-	0.37	0.63	-
QE File No.	Time-out for function test or others (hrs)		Issued Date		Reported By		Approved By		
DG19FNL027	2695.00		2019/12/6		Loly.Wang		Tim.Yi		