

DC FAN LIFE EXPERIMENT REPORT

Available for these models with lower speed and same physical structure. All model may be followed byRxx orFxx series suffixes. This test report applies to PFM 60x60x38.0 mm series as the right table	PFM0612XHEB7T				

Representative Test P/N : PFM0612HE-SP00

Equipment: 1.Oven: E24-F0118	On/Off Cycles: Every 500 hours
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◎ **L₁₀ Expectancy:** **70,000** hours minimum @ fan rated voltage and the temperature of 40℃
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,

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

where, (**B_{rc}**) 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) (Actual Test Temperature)	Unstress Temperature Tu (°C)	Acceleration Factor A _F	Quantity of Test Devices n (pcs)	Poisson Distribution Factor B _{rc}	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	8,478.0	1,194,503	170,643

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2012/11/23 2:00 PM	2014/3/5 12:46 PM	☐ In process	☐ In process (exceed requested)	☒ Termination	8478.0

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	3,378,565	482,652
30	16.00	2,389,006	341,287
40	8.00	1,194,503	170,643
50	4.00	597,252	85,322
60	2.00	298,626	42,661
70	1.00	149,313	21,330

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 >3dB over the original measure noise.

Test Result	☒ Accept ☐ Reject
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QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG12FNL167	7729.00	2014/10/23	NaNa.Wang	Tim.Yi

BGN (dBA) : 16.0

Temp (°C) : 21.0



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)				
3,478	2012/11/23 2:00 PM	2014/3/5 12:46 PM	56	0	8478.0				
Representative Test P/N : PFM0612HE-SP00			Current Test Status	☐ In process	☐ In process (exceed requested)	☒ Termination			
Equipment: 1.Oven: E24-F0118				On/Off Cycles: Every 500 hours					
Test Data Between Initial Test and Final Test									
Sample No.	Initial Test Current Spec. (A) 1.44 Max.	Final Test Current Spec. (A) 1.44 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 17020-19980	Final Test Speed Spec. (RPM) 17020-19980	Deviation (%)	Initial Test Noise Spec. (dB A) 69.1 Max	Final Test Noise Spec. (dB A) 69.1 Max	Deviation 3 dBMax.
1	1.15	1.04	-9.7	18377	18197	-1.0	64.2	63.3	-0.9
2	1.20	1.04	-13.1	18141	18328	1.0	63.8	63.5	-0.3
3	1.23	1.04	-15.5	18254	18321	0.4	64.5	63.7	-0.8
4	1.19	1.03	-13.4	18124	18365	1.3	64.7	63.9	-0.8
5	1.22	0.97	-20.5	18030	18300	1.5	63.7	64.1	0.4
6	1.19	1.01	-15.3	18423	18569	0.8	63.9	63.0	-0.9
7	1.22	1.02	-16.1	18341	18501	0.9	64.0	63.3	-0.7
8	1.24	1.00	-19.0	18076	18694	3.4	64.6	64.2	-0.4
9	1.19	0.96	-18.9	18171	18425	1.4	63.8	63.5	-0.3
10	1.24	1.02	-17.6	17930	18785	4.8	64.0	63.7	-0.3
11	1.18	0.99	-16.3	18125	18403	1.5	64.6	63.5	-1.1
12	1.17	1.02	-12.3	18249	18546	1.6	63.7	63.7	0.0
13	1.19	0.94	-21.0	18270	18284	0.1	64.0	63.5	-0.5
14	1.26	1.02	-19.2	18001	19112	6.2	64.4	63.7	-0.7
15	1.22	1.01	-17.6	18182	18600	2.3	63.9	63.1	-0.8
16	1.14	1.03	-10.1	18333	18469	0.7	64.0	63.3	-0.7
17	1.17	1.00	-15.1	18342	17988	-1.9	64.6	63.0	-1.6
18	1.19	1.03	-13.1	18287	18334	0.3	63.7	63.6	-0.1
19	1.18	1.02	-13.4	18537	18455	-0.4	63.9	63.6	-0.3
20	1.15	1.03	-10.5	18509	17489	-5.5	64.0	63.8	-0.2
21	1.15	1.01	-12.4	18279	18765	2.7	64.5	64.0	-0.5
22	1.22	0.94	-22.6	18020	17998	-0.1	63.9	62.9	-1.0
23	1.20	1.05	-12.9	18231	18483	1.4	64.3	63.2	-1.1
24	1.21	1.05	-13.1	18100	18569	2.6	63.7	64.3	0.6
25	1.17	1.03	-11.6	18280	18456	1.0	64.6	63.4	-1.2
26	1.19	1.03	-13.8	18332	18956	3.4	64.0	63.6	-0.4
27	1.16	0.99	-15.0	18503	18334	-0.9	64.5	63.8	-0.7
28	1.26	1.02	-19.0	17905	18480	3.2	64.3	64.0	-0.3
29	1.15	0.94	-18.0	18540	18467	-0.4	64.0	62.9	-1.1
30	1.16	1.02	-12.4	18479	18200	-1.5	63.9	63.2	-0.7
31	1.17	1.09	-7.0	18170	18871	3.9	64.2	63.6	-0.6
32	1.19	1.08	-9.4	18158	18455	1.6	64.6	63.8	-0.8
QE File No.	Time-out for function test or others (hours)		Issued Date	Reported By		Approved By			
DG12FNL167	7729.00		2014/10/23	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)				
3,478	2012/11/23 2:00 PM	2014/3/5 12:46 PM	56	0	8478.0				
Representative Test P/N : PFM0612HE-SP00			Current Test Status	☐ In process	☐ In process (exceed requested)	☒ Termination			
Equipment: 1.Oven: E24-F0118				On/Off Cycles: Every 500 hours					
Test Data Between Initial Test and Final Test									
Sample No.	Initial Test Current Spec. (A) 1.44 Max.	Final Test Current Spec. (A) 1.44 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 17020-19980	Final Test Speed Spec. (RPM) 17020-19980	Deviation (%)	Initial Test Noise Spec. (dB A) 69.1 Max	Final Test Noise Spec. (dB A) 69.1 Max	Deviation 3 dBMax.
33	1. 16	1. 10	-4.9	18271	18425	0.8	64.3	63.3	-1.0
34	1. 22	1. 06	-12.9	18264	19220	5.2	63.8	63.0	-0.8
35	1. 21	1. 08	-10.7	18045	18780	4.1	63.7	63.6	-0.1
36	1. 20	1. 07	-10.7	18304	19586	7.0	64.4	62.9	-1.5
37	1. 20	1. 10	-8.8	18184	19186	5.5	64.3	63.1	-1.2
38	1. 17	1. 09	-6.6	18513	19100	3.2	64.1	63.3	-0.8
39	1. 19	1. 08	-9.2	18160	18804	3.5	63.9	63.5	-0.4
40	1. 22	1. 10	-10.2	18169	18711	3.0	64.3	64.0	-0.3
41	1. 16	1. 12	-3.2	18384	18688	1.7	63.8	63.7	-0.1
42	1. 22	1. 08	-12.1	18119	18453	1.8	64.6	63.9	-0.7
43	1. 22	1. 10	-9.5	18122	18739	3.4	64.2	63.0	-1.2
44	1. 21	1. 07	-11.3	18302	18724	2.3	64.0	63.2	-0.8
45	1. 11	1. 08	-2.6	18517	19246	3.9	63.8	63.7	-0.1
46	1. 19	1. 08	-8.7	18146	18835	3.8	64.3	63.2	-1.1
47	1. 14	1. 08	-5.1	18538	18690	0.8	63.9	63.4	-0.5
48	1. 17	1. 09	-6.6	18477	18708	1.3	63.8	63.6	-0.2
49	1. 16	1. 12	-3.5	18380	19047	3.6	64.6	64.1	-0.5
50	1. 17	1. 10	-5.8	18518	18307	-1.1	64.1	63.8	-0.3
51	1. 15	1. 10	-4.1	18341	19101	4.1	64.5	62.9	-1.6
52	1. 20	1. 12	-6.7	18205	18930	4.0	64.8	63.1	-1.7
53	1. 21	1. 04	-13.9	18325	18603	1.5	64.0	63.3	-0.7
54	1. 23	1. 06	-14.3	18140	18835	3.8	63.7	63.5	-0.2
55	1. 20	1. 08	-10.0	18292	18690	2.2	64.2	63.7	-0.5
56	1. 27	1. 07	-15.2	17814	18708	5.0	63.9	63.9	0.0
X-Bar	1.2	1.0	-	18254.1	18612.8	-	64.13	63.51	-
σ	0.033	0.047	-	173.160	354.433	-	0.318	0.365	-
QE File No.	Time-out for function test or others (hrs)			Issued Date		Reported By		Approved By	
DG12FNL167	7729.00			2014/10/23		NaNa.Wang		Tim.Yi	