



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 PFR 80x80x38.0 mm series as the right table	PFR0812XHE-9J57	PFR0812XHE-BF62	PFR0812XHE-CH59		
	PFR0812XHE-9H98	PFR0812XHE-AG18			
	PFR0812XHE-AM89	PFR0812XHE-AC1C			
	PFR0812XHE-BB37	PFR0812XHE-BB02			

Representative Test P/N : PFR0812XHE-SP00

Equipment: 1.Oven: E24-F0158 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 Ts (°C)	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 40 °C (hours)	Verified L ₁₀ 40 °C (hours)
70	40	8.00	56	2.303	3,478	5,478.0	771,820	110,260

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2009/9/4 9:00 AM	2010/5/7 5:46 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	5478.0

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	2,183,036	311,862
30	16.00	1,543,639	220,520
40	8.00	771,820	110,260
50	4.00	385,910	55,130
55	2.83	272,879	38,983
60	2.00	192,955	27,565
70	1.00	96,477	13,782

- 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
DG09FNL123	2411.00	2010/8/2	Nan Yang	Zenny Lei



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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PFR0812XHE-9H98	PFR0812XHE-AG18		
PFR0812XHE-AM89	PFR0812XHE-AC1C		
PFR0812XHE-BB37	PFR0812XHE-BB02		

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2009/9/4 9:00 AM	2010/5/7 5:46 PM	56	0	5478.0

Representative Test P/N : PFR0812XHE-SP00	Current Test Status	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination
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Equipment: 1.Oven: E24-F0158 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
	4.0 Max.	4.0 Max.		12236-14364	12236-14364		75.5 Max	75.5 Max	
1	3.79	3.64	-4.0	13695	13505	-1.4	71.0	71.0	0.0
2	3.94	3.82	-3.0	13762	13804	0.3	71.1	71.6	0.5
3	3.94	3.75	-4.9	13833	13627	-1.5	70.9	71.3	0.4
4	3.91	3.71	-5.1	13766	13773	0.1	70.3	71.1	0.8
5	3.70	3.72	0.4	13535	13593	0.4	70.8	71.4	0.6
6	3.79	3.76	-1.0	13692	13658	-0.2	70.8	71.2	0.4
7	3.88	3.57	-7.8	13667	13421	-1.8	71.2	71.0	-0.2
8	3.85	3.87	0.4	13559	13981	3.1	70.3	71.6	1.3
9	3.90	3.59	-8.0	13645	13506	-1.0	70.5	71.1	0.6
10	3.87	3.68	-4.8	13611	13837	1.7	70.7	71.4	0.7
11	3.70	3.93	6.2	13511	13253	-1.9	70.8	71.6	0.8
12	3.77	3.90	3.7	13615	13900	2.1	70.6	71.3	0.7
13	3.91	3.71	-5.1	13593	13630	0.3	70.8	71.0	0.2
14	3.91	3.79	-3.0	13635	13667	0.2	70.3	71.2	0.9
15	3.90	3.81	-2.4	13468	13657	1.4	70.9	71.3	0.4
16	3.85	3.85	-0.1	13573	13974	3.0	71.1	71.1	0.0
17	3.64	3.66	0.7	13311	13517	1.5	70.7	71.5	0.8
18	3.58	3.65	1.9	13347	14078	5.5	70.5	71.0	0.5
19	3.75	3.84	2.4	13429	13843	3.1	70.3	71.4	1.1
20	3.65	3.82	4.7	13364	13831	3.5	70.2	71.1	0.9
21	3.70	3.68	-0.6	13518	13030	-3.6	70.4	71.3	0.9
22	3.61	3.80	5.3	13365	13783	3.1	70.6	71.0	0.4
23	3.67	3.71	1.1	13366	13536	1.3	70.6	71.4	0.8
24	3.74	3.68	-1.7	13611	13763	1.1	71.1	71.2	0.1
25	3.75	3.72	-0.7	13501	13601	0.7	70.8	71.1	0.3
26	3.81	3.63	-4.8	13567	13734	1.2	70.3	71.0	0.7
27	3.64	3.82	4.8	13398	13719	2.4	70.5	71.5	1.0
28	3.61	3.63	0.6	13238	13663	3.2	70.7	71.1	0.4
29	3.73	3.68	-1.3	13617	13440	-1.3	71.2	71.6	0.4
30	3.73	3.67	-1.6	13415	13653	1.8	70.8	71.5	0.7
31	3.79	3.90	2.8	13718	13801	0.6	71.1	71.4	0.3
32	3.78	3.78	-0.1	13506	13702	1.5	70.8	71.1	0.3
33	3.77	3.77	-0.1	13568	13724	1.1	70.4	71.3	0.9
34	3.70	3.84	3.8	13259	13978	5.4	70.6	71.4	0.8
35	3.81	3.57	-6.3	13757	13515	-1.8	71.0	71.0	0.0

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG09FNL123	2411.00	2010/8/2	Nan Yang	Zenny Lei



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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	2009/9/4 9:00 AM	2010/5/7 5:46 PM	56	0	5478.0

Representative Test P/N : PFR0812XHE-SP00	Current Test Status	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination
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Equipment: 1.Oven: E24-F0158	On/Off Cycles: Every 500 hours
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Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) 4.0 Max.	Final Test Current Spec. (A) 4.0 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 12236-14364	Final Test Speed Spec. (RPM) 12236-14364	Deviation (%)	Initial Test Noise Spec. (dB A) 75.5 Max	Final Test Noise Spec. (dB A) 75.5 Max	Deviation 3 dBMax.
36	3.77	3.66	-3.0	13565	13680	0.8	70.5	71.5	1.0
37	3.63	3.67	0.9	13379	13536	1.2	70.7	71.2	0.5
38	3.64	3.85	5.8	13523	13887	2.7	70.6	71.4	0.8
39	3.58	3.21	-10.3	12804	12613	-1.5	70.8	71.3	0.5
40	3.59	3.29	-8.4	13373	12907	-3.5	70.4	71.6	1.2
41	3.72	3.88	4.4	13386	13793	3.0	70.5	71.1	0.6
42	3.84	3.66	-4.7	13565	13630	0.5	70.7	71.4	0.7
43	3.70	3.62	-2.3	13506	13374	-1.0	70.6	71.2	0.6
44	3.81	3.69	-3.1	13507	13696	1.4	70.8	71.0	0.2
45	3.87	3.84	-0.6	13673	13796	0.9	70.4	71.3	0.9
46	3.57	3.41	-4.6	13366	12945	-3.1	70.7	71.2	0.5
47	3.62	3.73	3.1	13461	13603	1.1	71.1	71.5	0.4
48	3.85	3.55	-7.8	13527	13143	-2.8	70.8	71.3	0.5
49	3.78	3.66	-3.0	13483	13505	0.2	71.2	71.5	0.3
50	3.69	3.89	5.4	13400	13800	3.0	70.5	71.2	0.7
51	3.67	3.66	-0.1	13501	13629	0.9	70.8	71.6	0.8
52	3.70	3.61	-2.5	13477	13590	0.8	71.0	71.5	0.5
53	3.75	3.77	0.4	13452	13585	1.0	70.6	71.0	0.4
54	3.61	3.82	6.0	12996	13905	7.0	70.9	71.5	0.6
55	3.85	3.56	-7.6	13674	13256	-3.1	71.1	71.4	0.3
56	3.80	3.74	-1.7	13657	13352	-2.2	71.0	71.8	0.8
X-Bar	3.752	3.709	-	13505.2	13605.8	-	70.72	71.30	-
σ	0.104	0.139	-	178.778	281.124	-	0.269	0.209	-

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