



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 60x60x38.0 mm series as the right table	PFR0612XHE-BK95	PFR0612XHE-CF1V		
	PFR0612DHE-SP38			
	PFR0612XHE-BF81			
	PFR0612XHE-DU05			

Representative Test P/N : PFR0612XHE-SP00	
Equipment: 1.Oven: E24-F0159	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)	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	11,478.0	1,617,186	231,027

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2009/6/3 11:30 AM	2010/4/21 3:46 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	11478.0

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	4,574,094	653,442
30	16.00	3,234,373	462,053
40	8.00	1,617,186	231,027
50	4.00	808,593	115,513
60	2.00	404,297	57,757
70	1.00	202,148	28,878

Fan permission criteria for the measurement after test :

- Speed can not drop of $\geq 15\%$ below the original measured rpm.
- Current cannot increase $> 15\%$ of original measure current.
- Noise cannot $> 3\text{dB}$ over the original measure noise.

Test Result	<input checked="" type="checkbox"/> Accept
	<input type="checkbox"/> Reject

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG09FNL072	4254.50	2011/3/25	Nan Yang	Long Zhao



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	2009/6/3 11:30 AM	2010/4/21 3:46 PM	56	0	11478.0

Representative Test P/N : PFR0612XHE-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-F0159 On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) 2.76 Max.	Final Test Current Spec. (A) 2.76 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 14850-18150	Final Test Speed Spec. (RPM) 14850-18150	Deviation (%)	Initial Test Noise Spec. (dB A) 71.7 Max	Final Test Noise Spec. (dB A) 71.7 Max	Deviation 3 dBMax.
1	2.24	2.26	0.8	16252	16694	2.7	67.6	67.3	-0.3
2	2.26	2.11	-6.4	15752	16498	4.7	67.8	66.5	-1.3
3	2.25	2.23	-0.7	16173	16714	3.3	67.3	66.6	-0.7
4	2.46	2.33	-4.9	16262	16967	4.3	68.1	66.7	-1.4
5	2.30	2.29	-0.4	15957	16802	5.3	67.2	66.9	-0.3
6	2.29	2.10	-8.4	15865	16598	4.6	67.5	66.9	-0.6
7	2.21	2.15	-2.9	15737	16595	5.5	68.1	66.9	-1.2
8	2.27	2.19	-3.5	15997	15492	-3.2	67.8	66.8	-1.0
9	2.28	2.13	-6.5	15960	16453	3.1	67.4	66.9	-0.5
10	2.13	2.17	1.6	15423	16367	6.1	68.0	66.9	-1.1
11	2.18	2.10	-3.4	15994	16578	3.7	67.3	66.7	-0.6
12	2.42	2.16	-10.8	16443	16510	0.4	67.9	66.9	-1.0
13	2.23	2.20	-1.2	15859	16532	4.2	67.6	66.9	-0.7
14	2.35	2.18	-7.2	16323	16004	-2.0	67.4	66.8	-0.6
15	2.36	2.19	-7.1	16105	16734	3.9	67.2	66.6	-0.6
16	2.19	2.25	2.5	16026	16728	4.4	67.9	67.0	-0.9
17	2.24	2.06	-8.0	15975	16201	1.4	67.5	67.2	-0.3
18	2.11	1.91	-9.8	15704	15721	0.1	68.0	67.1	-0.9
19	2.38	2.16	-9.6	16266	16495	1.4	67.7	67.0	-0.7
20	2.32	2.09	-9.7	16175	16253	0.5	67.9	66.9	-1.0
21	2.07	2.15	3.5	15297	16354	6.9	67.4	66.8	-0.6
22	2.37	2.29	-3.1	16124	16987	5.4	67.6	66.7	-0.9
23	2.29	2.06	-10.2	16225	16060	-1.0	67.3	67.2	-0.1
24	2.31	2.16	-6.6	16077	16785	4.4	68.1	67.1	-1.0
25	2.36	2.21	-6.1	16087	16793	4.4	67.7	66.7	-1.0
26	2.32	2.16	-6.7	16159	15877	-1.7	68.0	66.9	-1.1
27	2.36	2.23	-5.5	15815	16717	5.7	67.5	67.0	-0.5
28	2.52	2.33	-7.5	16660	16540	-0.7	67.3	67.2	-0.1
29	2.33	2.25	-3.5	16132	16848	4.4	67.3	66.9	-0.4
30	2.41	2.15	-10.8	16013	16544	3.3	67.2	67.1	-0.1
31	2.33	2.08	-10.8	15959	16244	1.8	67.9	67.0	-0.9
32	2.41	2.13	-11.5	16087	16128	0.3	68.1	66.2	-1.9
33	2.06	2.08	1.0	15098	16202	7.3	67.8	66.3	-1.5
34	2.14	2.12	-0.7	15541	15985	2.9	67.4	66.7	-0.7
35	2.43	2.25	-7.3	16294	16032	-1.6	67.6	67.2	-0.4

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG09FNL072	4254.50	2011/3/25	Nan Yang	Long Zhao



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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	2009/6/3 11:30 AM	2010/4/21 3:46 PM	56	0	11478.0

Representative Test P/N : PFR0612XHE-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-F0159	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)	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
	2.76 Max.	2.76 Max.		14850-18150	14850-18150		71.7 Max	71.7 Max	
36	2.49	2.18	-12.6	16430	16401	-0.2	67.9	67.2	-0.7
37	2.39	2.22	-6.8	16014	16404	2.4	67.5	66.5	-1.0
38	2.31	2.01	-12.8	15780	16643	5.5	67.6	66.9	-0.7
39	2.32	2.19	-5.6	15931	16277	2.2	68.0	66.2	-1.8
40	2.04	2.24	10.1	15197	16380	7.8	67.4	66.3	-1.1
41	2.29	2.22	-3.1	15821	15350	-3.0	67.0	66.3	-0.7
42	2.36	2.30	-2.5	15830	16160	2.1	67.8	66.5	-1.3
43	2.32	2.32	0.2	15955	15931	-0.2	67.7	67.0	-0.7
44	2.30	2.22	-3.7	15648	15955	2.0	67.5	67.2	-0.3
45	2.16	2.15	-0.6	15538	15235	-2.0	67.3	66.8	-0.5
46	2.19	2.33	6.6	15827	16891	6.7	67.7	67.2	-0.5
47	2.29	2.10	-8.2	15761	15905	0.9	68.2	66.3	-1.9
48	2.15	2.25	4.6	15235	16595	8.9	67.4	66.8	-0.6
49	2.33	2.09	-10.0	16026	16532	3.2	68.1	67.0	-1.1
50	2.24	2.33	4.1	16007	16495	3.0	67.3	66.9	-0.4
51	2.46	2.23	-9.3	16891	16052	-5.0	67.8	66.8	-1.0
52	2.30	2.15	-6.6	15731	16235	3.2	68.0	67.2	-0.8
53	2.35	2.19	-7.0	16234	16158	-0.5	67.7	67.2	-0.5
54	2.40	2.26	-5.8	15927	16256	2.1	68.3	66.3	-2.0
55	2.29	2.18	-4.8	15905	16124	1.4	67.2	66.8	-0.4
56	2.52	2.26	-10.1	16424	16258	-1.0	67.8	66.7	-1.1
X-Bar	2.297	2.184	-	15963.0	16344.1	-	67.65	66.83	-
σ	0.110	0.087	-	340.331	383.438	-	0.313	0.291	-

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