



DC FAN LIFE EXPERIMENT REPORT

Available for these models with lower speed and same physical structure. All model may be followed by ARxx or AFxx series suffixes. This test report applies to PFC60x60x38 mm series as the right table	PFB0612UHE	PFC0612DE-5X11		
	PFB0612GHE	PFC0612DE-5X12		
	PFB0612EHE			
	PFB0612SHE			

Representative Test P/N :PFC0612DE-F00	
Equipment: 1.Oven: E24-F0052	On/Off Cycles: Every 500 hours

◎ **L₁₀ Expectancy: 50,000 hours minimum @ fan rated voltage and the temperature of 40°C**
 According to the equation for **Weibull distribution**, **MTTF ≐ 7×L₁₀ = 350,000 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) (Actual Test Temperature)	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)
60	40	4.00	56	2.303	4,968	6,956.0	490,031	70,004

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2005/5/7 11:00 PM	2006/5/2 5:45 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	6956.0

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. **Basically, MTBF is equal to MTTF, they use same formula to work out a life data.**)

Temperature for MTTF Estimation (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	11.31	1,386,017	198,002
30	8.00	980,062	140,009
40	4.00	490,031	70,004
50	2.00	245,015	35,002
60	1.00	122,508	17,501

Fan permission criteria for the measurement after test :

1. For current, the limit is less than spec.(max.).
2. For speed, the allowable decrease is less than 15%.
3. For noise, the limit is less than spec.(max.). + 3 dB

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
DG05FNL093	3666.50	2006/7/24 1:30 PM	Nan.yang	gx.xu



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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PFB0612UHE	PFC0612DE-5X11		
PFB0612GHE	PFC0612DE-5X12		
PFB0612EHE			
PFB0612SHE			

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
4,968	2005/5/7 11:00 PM	2006/5/2 5:45 PM	56	0	6956.0

Representative Test P/N :PFC0612DE-F00	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-F0052 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 (%)
	1.68Max.	1.68Max.		10800-13200	10800-13200		65.5Max	65.5Max	
1	1.32	1.33	0.6	12114	12191	0.6	63.7	62.4	-2.0
2	1.28	1.29	0.2	12097	12092	0.0	63.2	62.6	-0.9
3	1.35	1.34	-0.5	12298	12287	-0.1	63.1	62.0	-1.7
4	1.36	1.32	-2.9	12151	12339	1.5	63.4	63.4	0.0
5	1.37	1.36	-0.7	12006	12210	1.7	63.5	62.9	-0.9
6	1.28	1.27	-1.0	11997	12266	2.2	63.1	63.1	0.0
7	1.40	1.38	-1.6	12305	12367	0.5	63.4	62.9	-0.8
8	1.34	1.34	0.0	12369	12410	0.3	63.7	62.3	-2.2
9	1.30	1.40	7.6	12305	12488	1.5	63.8	63.5	-0.5
10	1.36	1.37	1.3	12333	12312	-0.2	63.1	63.1	0.0
11	1.25	1.26	1.0	12144	12114	-0.2	63.4	62.2	-1.9
12	1.35	1.31	-2.6	12049	12273	1.9	63.3	62.3	-1.6
13	1.37	1.35	-1.4	12146	12186	0.3	63.2	62.0	-1.9
14	1.37	1.38	0.7	12269	12579	2.5	63.4	62.9	-0.8
15	1.31	1.34	2.1	12276	12175	-0.8	63.3	64.1	1.3
16	1.30	1.25	-3.7	12067	12221	1.3	63.7	63.6	-0.2
17	1.20	1.18	-1.6	11902	11946	0.4	63.4	63.0	-0.6
18	1.31	1.30	-0.9	11994	12114	1.0	63.5	62.7	-1.3
19	1.29	1.31	1.5	12087	12122	0.3	63.4	62.1	-2.1
20	1.39	1.36	-2.2	12525	12579	0.4	63.4	61.9	-2.4
21	1.27	1.28	1.0	12216	12105	-0.9	63.7	62.4	-2.0
22	1.39	1.38	-0.9	12344	12381	0.3	63.2	63.0	-0.3
23	1.25	1.19	-4.6	11821	12035	1.8	63.5	64.2	1.1
24	1.30	1.28	-0.8	12100	12221	1.0	63.4	63.4	0.0
25	1.23	1.21	-1.3	11949	11918	-0.3	63.7	62.8	-1.4
26	1.35	1.37	1.0	12245	12580	2.7	63.6	62.6	-1.6
27	1.40	1.40	0.0	12416	12462	0.4	63.2	62.4	-1.3
28	1.32	1.32	-0.2	12172	12174	0.0	63.9	62.1	-2.8
29	1.28	1.24	-2.9	12045	12131	0.7	63.7	62.6	-1.7
30	1.27	1.27	0.2	12170	12124	-0.4	63.5	61.6	-3.0
31	1.19	1.20	0.8	11794	11854	0.5	63.4	62.3	-1.7
32	1.32	1.32	-0.2	12252	12245	-0.1	63.1	62.7	-0.6
33	1.27	1.29	1.7	12090	12029	-0.5	63.4	63.1	-0.5
34	1.33	1.33	0.0	12118	12168	0.4	63.5	63.3	-0.3
35	1.31	1.32	0.5	12078	12250	1.4	63.7	62.6	-1.7

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
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Test Data Between Initial Test and Final Test

Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)
	Current Spec. (A)	Current Spec. (A)		Speed Spec. (RPM)	Speed Spec. (RPM)		Noise Spec. (dB A)	Noise Spec. (dB A)	
	1.68Max.	1.68Max.		10800-13200	10800-13200		65.5Max	65.5Max	
36	1.40	1.38	-1.4	12207	12515	2.5	63.8	62.7	-1.7
37	1.32	1.30	-1.5	12130	12178	0.4	63.2	62.1	-1.7
38	1.40	1.40	-0.2	12366	12437	0.6	63.2	62.9	-0.5
39	1.26	1.25	-0.8	12193	12192	0.0	63.1	63.1	0.0
40	1.33	1.35	2.1	12292	12254	-0.3	63.7	62.7	-1.6
41	1.34	1.34	0.3	12392	12332	-0.5	63.4	61.9	-2.4
42	1.23	1.22	-0.8	11851	11843	-0.1	63.7	62.4	-2.0
43	1.33	1.32	-0.9	12218	12174	-0.4	63.4	64.0	0.9
44	1.35	1.33	-1.8	12025	12076	0.4	63.8	62.7	-1.7
45	1.29	1.28	-1.0	12146	12235	0.7	63.6	63.6	0.0
46	1.31	1.29	-1.6	12093	12136	0.4	63.4	62.4	-1.6
47	1.21	1.10	-8.8	11487	11546	0.5	63.9	62.5	-2.2
48	1.40	1.37	-2.1	12287	12366	0.6	63.4	62.4	-1.6
49	1.40	1.38	-0.9	12373	12366	-0.1	63.7	63.1	-0.9
50	1.34	1.34	-0.1	12313	12363	0.4	63.1	62.8	-0.5
51	1.09	1.07	-1.9	11365	11439	0.7	63.8	62.3	-2.4
52	1.39	1.39	0.2	12432	12405	-0.2	63.7	62.1	-2.5
53	1.38	1.37	-1.1	12410	12379	-0.2	63.5	64.1	0.9
54	1.27	1.27	-0.1	12095	12075	-0.2	63.1	62.4	-1.1
55	1.34	1.31	-2.3	12117	12196	0.7	63.4	62.6	-1.3
56	1.39	1.42	2.0	12369	12198	-1.4	63.2	62.0	-1.9
X-Bar	1.317	1.309	-	12150.1	12208.1	-	63.46	62.73	-
σ	0.063	0.071	-	213.324	218.143	-	0.234	0.597	-

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