



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 PFC 80x80x38 mm series as the right table	PFB0848UHE	PFB0848GHE	PFB0848EHE		

Representative Test P/N : PFC0848DE-SP01

Instruments used: 1. Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D 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 \cong 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 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 (hours)	Verified L ₁₀ (hours)
60	40	4.00	56	2.303	4,968	12,832.0	903,979	129,140

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2005/9/22 3:00 PM	2006/7/25 8:15 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	12832.0

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.)

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

Temperature for MTTF Estimation (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	11.31	2,556,838	365,263
30	8.00	1,807,957	258,280
40	4.00	903,979	129,140
50	2.00	451,989	64,570
60	1.00	225,995	32,285

QE File No.	Time-out for function test or	Issued Date	Reported By	Approved By
TH05FNL097	2381.00	2007/6/18 12:00 PM	Adoon	Luc



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)
4,968	2005/9/22 3:00 PM	2006/7/25 8:15 PM	56	0	12832.0
Representative Test P/N : PFC0848DE-SP01			Current Test Status	<input type="checkbox"/> In process In process	<input type="checkbox"/> In process (exceed requested) <input checked="" type="checkbox"/> Termination

Instruments used: 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample P/N : PFC0848DE-SP01

Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)
	Current Spec. (A) 0.60 Max.	Current Spec. (A) 0.60 Max.		Speed Spec. (RPM) 8000 Ref.	Speed Spec. (RPM) 8000-15%		Noise Spec. (dB A) 66.2 Max.	Noise Spec. (dB A) 69.2 Max.	
1	0.46	0.45	-1.3	7905	8217	3.9	61.5	63.8	3.7
2	0.44	0.44	0.9	7815	8168	4.5	61.3	63.7	3.9
3	0.53	0.52	-1.0	8179	8431	3.1	62.8	64.0	1.9
4	0.49	0.47	-4.3	8020	8212	2.4	62.1	63.2	1.8
5	0.46	0.44	-4.5	7827	8076	3.2	61.5	62.9	2.3
6	0.48	0.47	-2.8	7987	8268	3.5	62.0	63.7	2.7
7	0.44	0.43	-2.3	7792	8087	3.8	60.6	63.3	4.5
8	0.44	0.44	-1.1	7834	8119	3.6	62.1	63.0	1.4
9	0.50	0.49	-2.2	8086	8372	3.5	63.3	62.8	-0.8
10	0.50	0.49	-1.7	8053	8376	4.0	63.3	63.9	0.9
11	0.48	0.47	-1.9	8034	8321	3.6	62.5	63.6	1.8
12	0.48	0.45	-5.7	7984	8203	2.7	62.2	63.5	2.1
13	0.51	0.51	-0.7	8105	8435	4.1	63.0	63.9	1.4
14	0.46	0.46	-0.5	7926	8172	3.1	61.2	63.7	4.1
15	0.47	0.46	-2.0	7950	8209	3.3	61.5	63.9	3.9
16	0.49	0.48	-2.0	7962	8287	4.1	62.6	62.8	0.3
17	0.46	0.45	-1.9	7868	8161	3.7	61.4	62.9	2.4
18	0.45	0.45	-0.5	7829	8137	3.9	61.5	63.4	3.1
19	0.47	0.46	-1.2	7926	8242	4.0	61.3	62.9	2.6
20	0.44	0.45	1.3	7832	8155	4.1	61.0	62.7	2.8
21	0.44	0.44	0.0	7838	8072	3.0	61.5	62.9	2.3
22	0.47	0.47	-0.5	7956	8254	3.7	62.0	63.7	2.7
23	0.47	0.48	1.9	7962	8262	3.8	61.9	62.7	1.3
24	0.48	0.46	-3.3	7994	8178	2.3	62.1	62.8	1.1
25	0.47	0.48	1.1	7935	8212	3.5	61.3	64.6	5.4
26	0.46	0.46	0.9	7955	8221	3.3	61.6	63.2	2.6
27	0.51	0.51	-0.4	8129	8367	2.9	62.5	63.7	1.9
28	0.43	0.40	-6.8	7738	7849	1.4	61.2	62.3	1.8
29	0.45	0.45	1.0	7940	8173	2.9	62.0	63.3	2.1
30	0.46	0.47	2.3	7952	8240	3.6	61.6	63.6	3.2
31	0.46	0.46	-0.9	7948	8150	2.5	61.8	63.5	2.8
32	0.56	0.55	-1.8	8264	8530	3.2	62.9	64.5	2.5
33	0.51	0.50	-2.9	8073	8330	3.2	62.6	64.3	2.7
34	0.46	0.46	0.2	7930	8181	3.2	61.5	63.7	3.6
35	0.44	0.44	0.3	7848	8082	3.0	61.2	62.9	2.8



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4,968	2005/9/22 3:00 PM	2006/7/25 8:15 PM	56	0	12832.0

Representative Test P/N : PFC0848DE-SP01	Current Test Status	<input type="checkbox"/>	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination
	In process			

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Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)
	Current Spec. (A) 0.60 Max.	Current Spec. (A) 0.60 Max.		Speed Spec. (RPM) 8000 Ref.	Speed Spec. (RPM) 8000-15%		Noise Spec. (dB A) 66.2 Max.	Noise Spec. (dB A) 69.2 Max.	
36	0.56	0.56	0.0	8259	8539	3.4	62.6	64.8	3.5
37	0.47	0.45	-5.0	7912	8080	2.1	61.7	63.0	2.1
38	0.45	0.45	-0.1	7830	8113	3.6	60.8	63.3	4.1
39	0.46	0.45	-1.3	7911	8217	3.9	61.4	63.5	3.4
40	0.45	0.45	-0.5	7867	8169	3.8	61.6	63.4	2.9
41	0.50	0.49	-1.3	8096	8352	3.2	63.0	63.9	1.4
42	0.46	0.45	-2.8	7886	8149	3.3	61.2	62.9	2.8
43	0.46	0.46	-0.9	7906	8153	3.1	62.0	63.3	2.1
44	0.48	0.48	0.4	8048	8284	2.9	61.9	63.8	3.1
45	0.45	0.45	-0.4	7843	8143	3.8	61.2	63.3	3.4
46	0.45	0.46	2.3	7854	8170	4.0	61.4	63.6	3.6
47	0.47	0.47	0.8	7978	8300	4.0	62.3	63.9	2.6
48	0.46	0.45	-2.2	7912	8129	2.7	61.5	62.9	2.3
49	0.47	0.46	-2.5	7926	8160	3.0	61.6	63.3	2.8
50	0.49	0.48	-1.9	7995	8283	3.6	61.6	63.6	3.2
51	0.46	0.44	-3.5	7837	8114	3.5	60.8	63.1	3.8
52	0.46	0.45	-1.9	7872	8125	3.2	61.7	62.8	1.8
53	0.47	0.46	-1.6	7905	8168	3.3	61.9	63.4	2.4
54	0.51	0.51	-0.7	8118	8361	3.0	62.9	63.8	1.4
55	0.46	0.46	-0.9	7901	8170	3.4	61.8	63.5	2.8
56	0.47	0.46	-1.4	7920	8196	3.5	62.3	63.6	2.1
X-Bar	0.47	0.47	-	7949	8217	-	61.9	63.4	-
σ	0.027	0.028	-	111	120	-	0.64	0.51	-

QE File No.	Time-out for function test or others (hrs)	Issued Date	Reported By	Approved By
TH05FNL097	2381.00	2007/6/18 12:00 PM	Adoon	Luc