



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 PFC120x120x38mm series as the right table	PFB1248EHE	PFB1248GHE	PFC1248DE-T8L1		
	PFB1248SHE	PFB1248UHE			
	PFB1248VHE	PFC1248DE-5V77			
	PFB1248HHE	PFB1248UHE-WK01			

Representative Test P/N :PFC1248DE-F00

Equipment: 1. Oven : E24- F0119 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) (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	6,956	19,360.0	1,363,858	194,837

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2004/12/3 10:30 PM	2008/9/8 3:33 AM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	19360.0

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	11.31	3,857,573	551,082
30	8.00	2,727,716	389,674
40	4.00	1,363,858	194,837
50	2.00	681,929	97,418
60	1.00	340,965	48,709

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
DG04FNL348	26025.50	2010/2/7 12:00 AM	Nan.Yang	Zenny Lei



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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PFB1248SHE	PFB1248UHE		
PFB1248VHE	PFC1248DE-5V77		
PFB1248HHE	PFB1248UHE-WK01		

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
6,956	2004/12/3 10:30 PM	2008/9/8 3:33 AM	56	0	19360.0

Representative Test P/N :PFC1248DE-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- F0119 On/Off Cycles: Every 500 hours

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) 1.20Max.	Current Spec. (A) 1.20Max.		Speed Spec. (RPM) 5060-5940	Speed Spec. (RPM) 5060-5940		Noise Spec. (dB A) 70.5Max	Noise Spec. (dB A) 70.5Max	
1	0.90	0.89	-0.2	5397	5374	-0.4	67.7	66.5	-1.8
2	0.83	0.88	6.4	5261	5322	1.2	67.5	66.9	-0.9
3	0.89	0.91	2.2	5372	5322	-0.9	67.8	66.6	-1.8
4	0.90	0.87	-2.9	5411	5407	-0.1	67.2	66.8	-0.6
5	0.86	0.91	6.1	5533	5372	-2.9	67.6	67.0	-0.9
6	0.90	0.86	-3.9	5434	5222	-3.9	66.9	66.8	-0.1
7	0.92	0.91	-1.3	5385	5372	-0.2	67.5	67.1	-0.6
8	0.87	0.91	4.6	5536	5259	-5.0	68.2	67.2	-1.5
9	0.91	0.92	2.0	5481	5486	0.1	68.0	66.5	-2.2
10	0.84	0.87	3.6	5336	5509	3.2	67.7	66.9	-1.2
11	0.85	0.91	6.8	5322	5259	-1.2	67.0	67.1	0.1
12	0.89	0.82	-8.4	5492	5110	-7.0	67.6	66.8	-1.2
13	0.90	0.98	9.4	5522	5536	0.3	67.5	67.0	-0.7
14	0.92	0.86	-6.1	5382	5297	-1.6	67.2	66.6	-0.9
15	0.88	0.85	-3.2	5335	5173	-3.0	66.9	67.2	0.4
16	0.91	0.92	1.7	5473	5486	0.2	67.2	66.9	-0.4
17	0.88	0.84	-4.7	5439	5334	-1.9	68.0	67.3	-1.0
18	0.92	0.97	5.5	5451	5509	1.1	67.2	67.1	-0.1
19	0.88	0.88	0.5	5135	5297	3.2	68.0	66.7	-1.9
20	0.91	0.98	6.9	5448	5522	1.4	68.1	66.9	-1.8
21	0.94	0.91	-3.2	5496	5323	-3.1	68.2	66.5	-2.5
22	0.87	0.89	2.4	5473	5448	-0.5	67.3	67.1	-0.3
23	0.89	0.86	-2.4	5433	5297	-2.5	67.6	66.6	-1.5
24	0.90	0.85	-5.9	5448	5173	-5.0	68.2	67.0	-1.8
25	0.83	0.90	8.8	5513	5260	-4.6	66.9	66.7	-0.3
26	0.87	0.90	3.3	5413	5384	-0.5	67.2	66.9	-0.4
27	0.86	0.88	2.3	5422	5222	-3.7	68.3	67.2	-1.6
28	0.89	0.89	0.0	5472	5413	-1.1	68.0	66.7	-1.9
29	0.86	0.84	-2.4	5198	5334	2.6	67.9	66.9	-1.5
30	0.90	0.88	-2.0	5362	5297	-1.2	67.2	67.2	0.0
31	0.94	0.98	4.4	5499	5522	0.4	68.2	66.5	-2.5
32	0.83	0.85	2.5	5363	5210	-2.9	68.0	67.5	-0.7
33	0.85	0.91	6.6	5445	5323	-2.2	67.6	66.6	-1.5
34	0.89	0.85	-4.4	5423	5197	-4.2	66.9	66.9	0.0
35	0.88	0.95	7.8	5485	5460	-0.5	67.2	66.6	-0.9

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
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Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)
	Current Spec. (A) 1.20Max.	Current Spec. (A) 1.20Max.		Speed Spec. (RPM) 5060-5940	Speed Spec. (RPM) 5060-5940		Noise Spec. (dB A) 70.5Max	Noise Spec. (dB A) 70.5Max	
36	0.88	0.92	4.2	5432	5398	-0.6	68.5	66.9	-2.3
37	0.85	0.90	6.4	5358	5272	-1.6	66.9	66.8	-0.1
38	0.88	0.89	0.9	5465	5448	-0.3	67.7	66.3	-2.1
39	0.86	0.88	2.4	5385	5322	-1.2	67.9	67.0	-1.3
40	0.85	0.90	6.2	5312	5260	-1.0	68.0	66.5	-2.2
41	0.89	0.90	0.9	5402	5384	-0.3	68.2	66.9	-1.9
42	0.86	0.88	2.3	5369	5222	-2.7	67.5	66.8	-1.0
43	0.87	0.94	8.5	5412	5485	1.3	67.1	67.0	-0.1
44	0.80	0.85	6.0	5475	5210	-4.8	66.3	66.9	0.9
45	0.88	0.85	-3.3	5423	5197	-4.2	66.5	66.6	0.2
46	0.88	0.91	3.6	5369	5425	1.0	66.4	66.2	-0.3
47	0.86	0.91	5.8	5369	5322	-0.9	67.2	66.3	-1.3
48	0.82	0.87	6.1	5402	5322	-1.5	67.3	66.1	-1.8
49	0.83	0.85	2.4	5369	5460	1.7	68.0	66.7	-1.9
50	0.88	0.89	1.6	5412	5410	0.0	67.2	67.0	-0.3
51	0.84	0.90	7.6	5326	5272	-1.0	67.5	66.9	-0.9
52	0.82	0.86	4.9	5346	5423	1.4	66.8	66.2	-0.9
53	0.86	0.88	2.3	5358	5458	1.9	67.1	66.3	-1.2
54	0.85	0.90	5.9	5502	5426	-1.4	67.2	66.5	-1.0
55	0.84	0.88	4.8	5412	5312	-1.8	67.3	66.4	-1.3
56	0.86	0.87	1.2	5369	5485	2.2	67.7	66.8	-1.3
X-Bar	0.873	0.892	-	5408.2	5349.0	-	67.50	66.78	-
σ	0.031	0.036	-	77.151	106.636	-	0.511	0.302	-

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