



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		
PFB1248SHE	PFB1248UHE		
PFB1248VHE	PFC1248DE-5V77		
PFB1248HHE			

Representative Test P/N : PFC1248DE-F00

Equipment: 60°C Burn-in Room 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 $\hat{=}$ 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	8,360.0	588,939	84,134

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	2007/5/10 3:03 PM	<input type="checkbox"/> In process	<input checked="" type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination	8360.0

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	1,665,770	237,967
30	8.00	1,177,878	168,268
40	4.00	588,939	84,134
50	2.00	294,469	42,067
60	1.00	147,235	21,034

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	14349.00	2007/7/8 3:30 AM	Nan.Yang	Gx.Xu



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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	PFB1248SHE	PFB1248UHE		
	PFB1248VHE	PFC1248DE-5V77		
	PFB1248HHE			

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	2007/5/10 3:03 PM	56	0	8360.0

Representative Test P/N :PFC1248DE-F00

Equipment: 60°C Burn-in Room

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)	
	1.20Max.	1.20Max.		5060-5940	5060-5940		70.5Max	70.5Max	

1	0.91	0.92	0.5	5469	5545	1.4	67.5	68.0	0.7
2	0.89	0.87	-2.7	5502	5478	-0.4	67.6	68.1	0.7
3	0.90	0.88	-1.9	5445	5425	-0.4	67.3	68.2	1.3
4	0.88	0.87	-1.3	5425	5543	2.2	67.8	68.2	0.6
5	0.91	0.86	-5.3	5305	5470	3.1	68.0	67.9	-0.1
6	0.92	0.90	-2.6	5505	5464	-0.7	67.5	68.3	1.2
7	0.88	0.85	-3.1	5425	5551	2.3	67.4	68.5	1.6
8	0.87	0.87	0.2	5369	5471	1.9	67.3	67.6	0.4
9	0.90	0.91	0.7	5377	5481	1.9	67.5	67.5	0.0
10	0.88	0.87	-1.7	5417	5553	2.5	67.6	68.2	0.9
11	0.89	0.88	-1.6	5439	5442	0.1	67.7	68.0	0.4
12	0.88	0.90	1.7	5489	5493	0.1	67.9	68.4	0.7
13	0.96	0.96	-0.1	5479	5627	2.7	68.0	68.2	0.3
14	0.94	0.87	-7.6	5425	5601	3.2	67.8	68.3	0.7
15	0.91	0.85	-6.7	5469	5595	2.3	67.5	67.9	0.6
16	0.92	0.90	-2.2	5453	5536	1.5	67.3	68.5	1.8
17	0.96	0.90	-6.0	5505	5596	1.7	67.8	68.3	0.7
18	0.91	0.91	0.0	5484	5512	0.5	67.9	68.4	0.7
19	0.91	0.88	-3.8	5437	5555	2.2	67.5	68.5	1.5
20	0.86	0.94	9.2	5472	5550	1.4	67.8	68.2	0.6
21	0.88	0.87	-0.8	5536	5501	-0.6	67.6	68.0	0.6
22	0.86	0.83	-3.5	5418	5483	1.2	67.8	68.7	1.3
23	0.89	0.82	-8.0	5369	5710	6.4	67.5	68.8	1.9
24	0.86	0.89	3.1	5472	5489	0.3	67.8	68.2	0.6
25	0.85	0.80	-5.4	5402	5437	0.6	67.4	68.2	1.2
26	0.92	0.93	0.5	5479	5660	3.3	67.8	68.0	0.3
27	0.89	0.95	6.4	5502	5604	1.9	67.2	67.9	1.0
28	0.90	0.89	-0.8	5539	5600	1.1	68.1	67.8	-0.4
29	0.85	0.83	-1.9	5476	5330	-2.7	67.5	68.3	1.2
30	0.89	0.88	-1.2	5369	5467	1.8	67.4	68.5	1.6
31	0.92	0.93	0.7	5476	5614	2.5	67.3	68.3	1.5
32	0.92	0.90	-2.4	5420	5670	4.6	67.8	68.2	0.6
33	0.88	0.89	1.4	5502	5436	-1.2	67.4	68.1	1.0
34	0.89	0.85	-4.8	5369	5446	1.4	67.8	68.2	0.6
35	0.92	0.88	-4.6	5428	5479	0.9	67.3	68.3	1.5

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
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Representative Test P/N :PFC1248DE-F00	Current Test Status	<input type="checkbox"/> In process	<input checked="" type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination
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Equipment: 60°C Burn-in Room 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)	Current Spec. (A)		Speed Spec. (RPM)	Speed Spec. (RPM)		Noise Spec. (dB A)	Noise Spec. (dB A)	
	1.20Max.	1.20Max.		5060-5940	5060-5940		70.5Max	70.5Max	
36	0.87	0.92	5.5	5489	5484	-0.1	68.0	68.2	0.3
37	0.88	0.84	-4.5	5358	5451	1.7	67.9	68.3	0.6
38	0.86	0.87	1.0	5418	5577	2.9	67.8	68.4	0.9
39	0.89	0.90	0.8	5276	5444	3.2	67.8	68.2	0.6
40	0.91	0.91	-0.4	5496	5448	-0.9	67.6	67.9	0.4
41	0.90	0.91	1.2	5444	5562	2.2	67.8	67.9	0.1
42	0.88	0.87	-1.3	5467	5520	1.0	67.4	68.2	1.2
43	0.90	0.85	-5.7	5471	5533	1.1	67.5	68.0	0.7
44	0.86	0.89	3.6	5428	5417	-0.2	67.8	68.6	1.2
45	0.87	0.91	4.0	5439	5519	1.5	67.9	68.4	0.7
46	0.92	0.90	-1.7	5428	5649	4.1	67.8	68.2	0.6
47	0.88	0.84	-4.1	5378	5519	2.6	67.5	68.3	1.2
48	0.89	0.87	-2.7	5369	5406	0.7	68.0	67.1	-1.3
49	0.88	0.90	2.0	5427	5508	1.5	67.6	67.9	0.4
50	0.87	0.86	-1.4	5502	5550	0.9	67.5	68.2	1.0
51	0.86	0.84	-1.9	5376	5537	3.0	67.8	68.5	1.0
52	0.88	0.90	2.0	5353	5529	3.3	67.6	68.0	0.6
53	0.90	0.87	-3.3	5451	5649	3.6	67.0	68.1	1.6
54	0.86	0.83	-3.0	5328	5586	4.8	68.1	68.3	0.3
55	0.88	0.89	1.1	5447	5492	0.8	67.8	68.5	1.0
56	0.87	0.87	0.1	5419	5562	2.6	67.9	68.0	0.1
X-Bar	0.891	0.881	-	5435.9	5524.2	-	67.65	68.18	-
σ	0.025	0.032	-	56.787	75.296	-	0.247	0.288	-

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