



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 PFB 40X40X28.0mm series as the right table	PFB0412EN-EEXD				
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Representative Test P/N :PFB0412EN-E	
Equipment: 1.Oven: E24-T0161	On/Off Cycles: Every 500 hours

◎ **L₁₀ Expectancy:** **70,000** hours minimum @ fan rated voltage and the temperature 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) (Actual Test Temperature)	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)
85	40	22.63	56	2.303	1,230	3,360.0	1,338,992	191,285

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2019/1/8 1:40 PM	2019/3/28 1:34 PM	<input type="checkbox"/> In process	<input checked="" type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination	3360.0

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. Speed can not drop of ≥ 15% below the original measured rpm.
 2. Current cannot increase > 15% of original measure current.
 3. Noise cannot >3dB over the original measure noise.

Temperature for MTTF Estimation (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	64.00	3,787,243	541,035
30	45.25	2,677,985	382,569
40	22.63	1,338,992	191,285
50	11.31	669,496	95,642
60	5.66	334,748	47,821
70	2.83	167,374	23,911
80	1.41	83,687	11,955
85	1.00	59,176	8,454

Test Result	<input checked="" type="checkbox"/> Accept <input type="checkbox"/> Reject
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QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG19FNL002	1570.33	2019/8/2	Loly.Wang	Tim.Yi



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)				
1,230	2019/1/8 1:40 PM	2019/3/28 1:34 PM	56	0	3360.0				
Representative Test P/N :PFB0412EN-E			Current Test Status	<input type="checkbox"/> In process	<input checked="" type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination			
Equipment: 1.Oven: E24-T0161				On/Off Cycles: Every 500 hours					
Test Data Between Initial Test and Final Test									
Sample	Initial Test Current Spec. (A) 3.5 Max.	Final Test Current Spec. (A) 3.5 Max.	Criteria	Initial Test Speed Spec. (RPM) 28250-35750	Final Test Speed Spec. (RPM) 28250-35750	Criteria	Initial Test Noise Spec. (dB A) 74.5 Max	Final Test Noise Spec. (dB A) 74.5 Max	Criteria 3 dB
1	2.390	2.452	2.6	32296	32668	1.2	72.3	72.0	-0.3
2	2.412	2.606	8.0	32147	33309	3.6	72.1	72.0	-0.1
3	2.390	2.380	-0.4	32078	32522	1.4	71.6	71.9	0.3
4	2.396	2.275	-5.1	30654	31887	4.0	71.8	71.8	0.0
5	2.477	2.474	-0.1	30962	32122	3.7	72.0	71.5	-0.5
6	2.506	2.397	-4.3	32195	32325	0.4	71.8	71.4	-0.4
7	2.399	2.370	-1.2	29562	31952	8.1	71.7	71.0	-0.7
8	2.371	2.515	6.1	32121	32473	1.1	72.2	72.1	-0.1
9	2.427	2.392	-1.4	31652	32452	2.5	72.3	71.1	-1.2
10	2.485	2.453	-1.3	31794	32109	1.0	71.0	71.2	0.2
11	2.506	2.405	-4.0	32195	32490	0.9	71.4	71.9	0.5
12	2.502	2.471	-1.2	32166	32226	0.2	72.8	71.7	-1.1
13	2.456	2.402	-2.2	32236	32686	1.4	72.5	71.6	-0.9
14	2.473	2.376	-3.9	32140	32325	0.6	72.2	71.5	-0.7
15	2.422	2.394	-1.2	32381	32572	0.6	71.5	71.9	0.4
16	2.425	2.360	-2.7	31913	32408	1.6	71.6	72.0	0.4
17	2.471	2.452	-0.8	31898	32586	2.2	72.2	72.3	0.1
18	2.469	2.338	-5.3	30709	32251	5.0	71.8	71.1	-0.7
19	2.407	2.421	0.6	31697	32688	3.1	71.7	71.6	-0.1
20	2.392	2.324	-2.8	32401	32050	-1.1	72.2	71.9	-0.3
21	2.376	2.385	0.4	32331	32542	0.7	72.4	72.0	-0.4
22	2.181	2.485	13.9	32605	32438	-0.5	72.1	71.8	-0.3
23	2.563	2.455	-4.2	33047	32715	-1.0	72.0	71.0	-1.0
24	2.456	2.320	-5.5	32147	32499	1.1	71.9	71.1	-0.8
25	2.469	2.503	1.4	30709	32660	6.4	72.0	71.6	-0.4
26	2.355	2.426	3.0	32486	32622	0.4	71.9	71.4	-0.5
27	2.600	2.378	-8.5	32448	32284	-0.5	72.0	71.7	-0.3
28	2.465	2.441	-1.0	32044	32662	1.9	72.3	71.5	-0.8
QE File No.	Time-out for function test or others (hours)		Issued Date		Reported By		Approved By		
DG19FNL002	1570.33		2019/8/2		Loly.Wang		Tim.Yi		



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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1,230	2019/1/8 1:40 PM	2019/3/28 1:34 PM	56	0	3360.0				
Representative Test P/N :PFB0412EN-E			Current Test Status		<input type="checkbox"/> In process	<input checked="" type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination		
Equipment: 1.Oven: E24-T0161				On/Off Cycles: Every 500 hours					
Test Data Between Initial Test and Final Test									
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29	2.340	2.401	2.6	32286	32677	1.2	72.4	71.7	-0.7
30	2.382	2.367	-0.6	31719	32231	1.6	71.7	71.8	0.1
31	2.474	2.454	-0.8	32902	32519	-1.2	71.6	71.2	-0.4
32	2.409	2.426	0.7	32110	32681	1.8	72.0	71.3	-0.7
33	2.299	2.491	8.4	32069	33062	3.1	71.9	72.3	0.4
34	2.346	2.464	5.0	31976	32813	2.6	71.6	71.7	0.1
35	2.391	2.399	0.3	31787	32482	2.2	72.1	71.3	-0.8
36	2.363	2.510	6.2	31813	32776	3.0	72.1	72.3	0.2
37	2.507	2.319	-7.5	32704	32329	-1.1	71.5	71.8	0.3
38	2.414	2.408	-0.2	32226	32608	1.2	71.9	72.4	0.5
39	2.472	2.341	-5.3	32487	32828	1.0	72.3	71.0	-1.3
40	2.454	2.433	-0.9	32286	32861	1.8	71.9	72.0	0.1
41	2.295	2.344	2.1	30727	32029	4.2	72.0	71.6	-0.4
42	2.450	2.297	-6.2	32292	32108	-0.6	72.4	71.4	-1.0
43	2.230	2.393	7.3	32288	32740	1.4	72.1	71.3	-0.8
44	2.340	2.426	3.7	32340	32647	0.9	72.0	71.0	-1.0
45	2.303	2.393	3.9	31742	32483	2.3	72.3	71.6	-0.7
46	2.423	2.542	4.9	30927	33063	6.9	71.8	72.0	0.2
47	2.389	2.314	-3.1	32099	31935	-0.5	72.1	71.5	-0.6
48	2.485	2.476	-0.4	31785	32655	2.7	72.3	71.8	-0.5
49	2.438	2.287	-6.2	31986	31896	-0.3	72.1	70.7	-1.4
50	2.230	2.295	2.9	32288	32162	-0.4	71.9	71.3	-0.6
51	2.459	2.478	0.8	32288	32755	1.4	72.3	71.3	-1.0
52	2.415	2.358	-2.4	31115	32351	4.0	71.6	71.7	0.1
53	2.349	2.422	3.1	32662	32238	-1.3	72.4	72.2	-0.2
54	2.426	2.464	1.6	31450	32863	4.5	72.1	71.7	-0.4
55	2.230	2.283	2.4	32288	32199	-0.3	72.3	71.2	-1.1
56	2.398	2.394	-0.2	32863	32798	-0.2	71.5	71.3	-0.2
X-Bar	2.410	2.408	-	31973.554	32487.714	-	71.991	71.607	-
σ	0.081	0.070	-	642.175	309.662	-	0.327	0.393	-
QE File No.	Time-out for function test or others (hours)		Issued Date		Reported By		Approved By		
DG19FNL002	1570.33		2019/8/2		Loly.Wang		Tim.Yi		