

DC FAN LIFE EXPERIMENT REPORT

Available for these models with lower speed and same physical structure. All model may be followed byRxx orFxx series suffixes. This test report applies to PFB 80x80x38.0mm series as the right table					

Representative Test P/N : PFB0824DHECT3

Equipment: 1.Oven: E24-T0161

On/Off Cycles: Every 500 hours

◎ L_{10} Expectancy: **50,000** hours minimum @ fan rated voltage and the temperature of 40℃

According to the equation for **Weibull distribution**, $MTTF \cong 7 \times L_{10} =$ **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,

$$t = 1.036 \times MTTF \times [(B_{r,c}) \div n]^{0.91} \div A_F, \text{ and } A_F = 2^{(T_s - T_u)/10}$$

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)
70	40	8.00	56	2.303	2,484	6,484.0	913,560	130,509

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2018/1/3 9:30 AM	2018/5/17 12:07 AM	☐ In process	☒ In process (exceed requested)	☐ Termination	6484.0

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' L_{10} 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	22.63	2,583,937	369,134
30	16.00	1,827,119	261,017
40	8.00	913,560	130,509
50	4.00	456,780	65,254
60	2.00	228,390	32,627
70	1.00	114,195	16,314

Fan permission criteria for the measurement after test :

1. Speed can not drop of $\geq 15\%$ below the original measured rpm.
2. Current cannot increase $> 15\%$ of original measure current.
3. Noise cannot $> 3\text{dB}$ over the original measure noise.

Test Result

☒ Accept
☐ Reject

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG17FNL170	2626.50	2019/1/18	Poppy.Liang	Tim.Yi

BGN (dBA) : 15.8

Temp (°C) : 20.9



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)				
2,484	2018/1/3 9:30 AM	2018/5/17 12:07 AM	56	0	6484.0				
Representative Test P/N : PFB0824DHECT3			Current Test Status		☐ In process ☒ In process (exceed requested) ☐ Termination				
Equipment: 1.Oven: E24-T0161				On/Off Cycles: Every 500 hours					
Test Data Between Initial Test and Final Test									
Sample No.	Initial Test Current Spec. (A) 1.63 Max.	Final Test Current Spec. (A) 1.63 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 7200-8800	Final Test Speed Spec. (RPM) 7200-8800	Deviation (%)	Initial Test Noise Spec. (dB A) 66.0 Max	Final Test Noise Spec. (dB A) 66.0 Max	Deviation 3 dBMax.
1	0.91	0.99	8.9	7878	8066	2.4	61.9	61.6	-0.3
2	0.89	0.89	0.8	7859	8012	1.9	61.0	61.0	0.0
3	0.89	0.90	1.1	7912	8472	7.1	61.8	61.0	-0.8
4	0.93	0.91	-2.5	7806	8025	2.8	61.7	61.6	-0.1
5	0.93	0.96	3.1	7822	8272	5.8	61.8	61.2	-0.6
6	0.90	0.91	1.1	7831	8042	2.7	62.0	60.9	-1.1
7	0.89	0.89	-0.3	7912	8327	5.2	61.5	61.0	-0.5
8	0.93	0.88	-4.6	7818	8113	3.8	61.4	61.3	-0.1
9	0.91	0.99	8.2	7858	8520	8.4	61.5	61.5	0.0
10	0.87	0.90	3.0	7884	8003	1.5	61.2	61.1	-0.1
11	0.91	0.87	-4.0	7879	8220	4.3	61.9	61.5	-0.4
12	0.94	0.96	2.7	7800	8355	7.1	61.4	61.4	0.0
13	0.91	0.94	3.5	7751	8179	5.5	61.0	61.0	0.0
14	0.93	0.92	-1.1	7808	8082	3.5	62.0	62.2	0.2
15	0.93	1.02	9.4	7827	8605	9.9	61.1	60.7	-0.4
16	0.94	0.92	-2.7	7770	8070	3.9	61.3	61.3	0.0
17	0.90	0.93	3.3	7879	8467	7.5	61.7	61.0	-0.7
18	0.91	0.92	1.3	7790	8019	2.9	62.0	61.2	-0.8
19	0.93	0.92	-1.0	7978	8246	3.4	61.7	61.4	-0.3
20	0.92	0.94	1.5	7837	8184	4.4	61.5	61.4	-0.1
21	0.91	0.94	3.6	7802	8557	9.7	61.9	62.2	0.3
22	0.90	0.88	-2.2	7886	8040	2.0	61.8	61.8	0.0
23	0.93	0.96	3.3	7810	8760	12.2	61.3	61.3	0.0
24	0.91	0.98	8.3	7867	8229	4.6	61.7	61.0	-0.7
25	0.91	0.94	3.3	7779	8206	5.5	61.4	61.0	-0.4
26	0.92	0.98	7.0	7843	8408	7.2	61.2	61.3	0.1
27	0.94	0.97	3.9	7790	8432	8.2	61.3	62.3	1.0
28	0.91	0.93	2.9	7869	8196	4.2	61.6	61.0	-0.6
29	0.91	0.95	4.2	7796	8575	10.0	61.9	61.0	-0.9
30	0.92	0.96	4.2	7843	8187	4.4	60.9	60.8	-0.1
31	0.92	0.95	2.4	7821	8412	7.6	61.5	60.7	-0.8
32	0.90	1.00	11.4	7773	8309	6.9	61.8	61.5	-0.3
QE File No.	Time-out for function test or others (hours)		Issued Date		Reported By	Approved By			
DG17FNL170	2626.50		2019/1/18		Poppy.Liang	Tim.Yi			



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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33	0.90	0.95	5.5	7826	8412	7.5	60.9	60.7	-0.2
34	0.92	1.00	9.3	7851	8309	5.8	61.4	61.0	-0.4
35	0.91	1.01	11.7	7861	8420	7.1	61.8	62.6	0.8
36	0.88	0.93	6.0	7861	8060	2.5	61.3	61.8	0.5
37	0.92	0.90	-2.3	7828	8482	8.4	61.3	61.7	0.4
38	0.94	1.01	7.5	7785	8306	6.7	61.2	60.7	-0.5
39	0.92	0.95	3.5	7830	8560	9.3	61.7	61.5	-0.2
40	0.91	0.94	3.6	7788	8192	5.2	61.6	61.2	-0.4
41	0.95	0.98	3.9	7940	8717	9.8	61.3	61.2	-0.1
42	0.94	1.00	6.7	7779	8280	6.4	60.7	61.4	0.7
43	0.92	0.91	-1.0	7832	8530	8.9	60.5	60.7	0.2
44	0.91	0.96	4.6	7779	8450	8.6	60.8	61.0	0.2
45	0.94	0.96	1.7	7952	8433	6.0	61.0	60.8	-0.2
46	0.93	0.91	-1.9	7813	8048	3.0	61.3	61.1	-0.2
47	0.93	0.92	-1.1	7823	8430	7.8	62.1	61.2	-0.9
48	0.87	0.98	12.8	7888	8382	6.3	61.2	61.3	0.1
49	0.91	0.92	1.1	7848	8242	5.0	62.0	61.2	-0.8
50	0.91	0.89	-1.5	7857	8343	6.2	61.6	61.2	-0.4
51	0.92	0.94	1.5	7829	8322	6.3	62.1	61.6	-0.5
52	0.94	0.97	3.6	7786	8338	7.1	61.4	61.2	-0.2
53	0.91	0.98	7.3	7843	8388	6.9	61.4	61.3	-0.1
54	0.88	0.99	12.2	7862	8378	6.6	61.1	60.8	-0.3
55	0.91	0.94	3.5	7859	8300	5.6	60.5	60.5	0.0
56	0.88	0.94	6.8	7861	8117	3.3	60.9	61.3	0.4
X-Bar	0.91	0.94	-	7838.55	8304.09	-	61.44	61.25	-
σ	0.02	0.04	-	46.97	185.58	-	0.39	0.42	-
QE File No.	Time-out for function test or others (hrs)		Issued Date		Reported By		Approved By		
DG17FNL170	2626.50		2019/1/18		Poppy.Liang		Tim.Yi		