

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 120x120x38mm series as the right table					

Representative Test P/N: PFB1224UHEC8X__					
Equipment: 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D					

Life Expectancy: L10 50,000 hours minimum @ fan rated voltage and the temperature of 50°C

According to the equation for **Weibull distribution**, **MTTF $7 \times L10 = 350,000$ 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,

$$t = 1.036 \times MTTF \times [(B_r;c) / n]^{0.91} / AF, \text{ and } AF = 2^{(T_s - T_u)/10}$$

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 50°C (hours)	Verified L10 50°C (hours)
70	50	4.00	30	2.303	8,767	9,205	367,466	52,495

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
25-Jun-18	11-Oct-19	☐ In process	☒ In process (exceed requested)	☐ Termination	9,205

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 ()	Acceleration Factor A_F	Estimated MTTF (hours)	Estimated L10 (hours)
25	22.63	2,078,700	296,957
30	16.00	1,469,863	209,980
40	8.00	734,932	104,990
50	4.00	367,466	52,495
60	2.00	183,733	26,248
70	1.00	91,866	13,124
Test Result		☒ Accept	
		☐ Reject	

Fan acceptance criteria for the measurements after test :

- Speed can not decrease $\geq 15\%$ below the original measured RPM.
- Current cannot increase $> 15\%$ over original measure current.
- Noise cannot increase $> 3\text{dB}$ over the original measured noise.

QE File No.	Time-out for function test or others (hours)	Date of issue	Reported By	Approved By
TH18FNL004	2,147	11-Oct-19	Natthichakorn	Niranam



DC FAN FUNCTION TEST RECORD FOR CUSTOMIZED 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)
8,767	25-Jun-18	11-Oct-19	30	0	9,205
Representative Test P/N: PFB1224UHEC8X__			Current Test Status	☐ In process	☒ In process (exceed requested) ☐ Termination
Equipment: 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D					

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 dB
	Current Spec. Max (A) 2.4	Current Spec. Max (A) 2.4		Speed Spec. REF (RPM) 5500	Speed Spec. REF (RPM) 5500		Noise at 1 m Max (dB A) 70.5	Noise at 1 m Max (dB A) 70.5	
1	1.76	1.83	4.2	5738	5368	-6.4	68.5	68.3	-0.2
2	1.84	1.79	-2.7	5381	5386	0.1	68.4	68.4	0.0
3	1.85	1.78	-3.5	5403	5372	-0.6	68.8	68.2	-0.6
4	1.78	1.72	-3.3	5528	5366	-2.9	68.9	68.1	-0.8
5	1.68	1.70	1.4	5613	5272	-6.1	69.1	68.0	-1.1
6	1.76	1.73	-1.4	5399	5371	-0.5	68.7	68.2	-0.5
7	1.79	1.75	-2.2	5296	5397	1.9	68.8	67.9	-0.9
8	1.74	1.71	-1.7	5449	5386	-1.2	68.9	68.3	-0.6
9	1.63	1.65	1.4	5661	5310	-6.2	68.7	68.4	-0.3
10	1.80	1.76	-2.1	5424	5404	-0.4	68.8	68.2	-0.6
11	1.77	1.75	-1.3	5308	5375	1.3	68.7	67.3	-1.4
12	1.71	1.69	-1.1	5446	5284	-3.0	68.9	68.2	-0.7
13	1.75	1.78	1.9	5793	5400	-6.8	68.6	67.9	-0.7
14	1.76	1.73	-1.5	5312	5385	1.4	68.7	68.3	-0.4
15	1.79	1.76	-1.5	5411	5376	-0.6	68.6	68.2	-0.4
16	1.78	1.75	-1.7	5525	5352	-3.1	68.7	68.5	-0.2
17	1.72	1.69	-1.6	5553	5375	-3.2	69.1	68.3	-0.8
18	1.80	1.78	-0.9	5411	5428	0.3	68.7	68.4	-0.3
19	1.74	1.73	-0.7	5444	5384	-1.1	69.2	68.5	-0.7
20	1.76	1.75	-0.6	5577	5362	-3.9	68.4	68.6	0.2
21	1.69	1.67	-1.0	5772	5292	-8.3	68.5	68.1	-0.4
22	1.84	1.80	-2.1	5470	5405	-1.2	68.6	68.3	-0.3
23	1.83	1.77	-3.2	5521	5399	-2.2	68.5	67.9	-0.6
24	1.70	1.77	4.3	5475	5302	-3.2	68.4	68.1	-0.3
25	1.76	1.80	2.6	5771	5416	-6.2	68.6	67.9	-0.7
26	1.84	1.76	-4.1	5431	5392	-0.7	68.7	67.8	-0.9
27	1.78	1.73	-2.9	5293	5368	1.4	68.8	68.3	-0.5
28	1.81	1.74	-3.8	5554	5389	-3.0	68.9	68.5	-0.4
29	1.82	1.78	-2.0	5562	5415	-2.6	68.8	68.4	-0.4
30	1.75	1.79	2.2	5380	5407	0.5	68.6	68.2	-0.4
X-bar	1.77	1.75	-	5497	5371	-	68.7	68.2	-
σ	0.05	0.04	-	142	40	-	0.2	0.3	-

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TH18FNL004	2,147	11-Oct-19	Natthichakorn	Niranam