



# 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 PFR 120x120x38.0 mm series as the right table	PFR1212UHE			

<b>Representative Test P/N : PFR1212DHE-SP00</b>	
<b>Equipment: 1.Oven: E24-T0164</b>	On/Off Cycles: Every 500 hours

☉ **L<sub>10</sub> 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<sub>r,c</sub>) 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)	Unstress Temperature Tu (°C)	Acceleration Factor A <sub>F</sub>	Quantity of Test Devices n (pcs)	Poisson Distribution Factor B <sub>r,c</sub>	Required test time with zero failure t (hours)	Actual test time with zero failure t (hours)	Verified MTTF 40 °C (hours)	Verified L <sub>10</sub> 40 °C (hours)
70	40	8.00	56	2.303	3,478	6,478.0	912,714	130,388

### Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2009/5/14 4:00 PM	2010/2/24 5:16 AM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	6478.0

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<sub>10</sub> 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 <sub>F</sub>	Estimated MTTF (hours)	Estimated L <sub>10</sub> (hours)
25	22.63	2,581,546	368,792
30	16.00	1,825,428	260,775
40	8.00	912,714	130,388
50	4.00	456,357	65,194
60	2.00	228,179	32,597
70	1.00	114,089	16,298

- Fan permission criteria for the measurement after test :
- Speed can not drop of ≥ 15% below the original measured rpm.
  - Current cannot increase > 15% of original measure current.
  - Noise cannot >3dB over the original measure noise.

<b>Test Result</b>	<input checked="" type="checkbox"/> <b>Accept</b>
	<input type="checkbox"/> <b>Reject</b>

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG09FNL059	3375.50	2010/7/2	Nan Yang	Zenny Lei



# DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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applies to PFR 120x120x38.0 mm series as the right table

PFR1212UHE				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2009/5/14 4:00 PM	2010/2/24 5:16 AM	56	0	<b>6478.0</b>

Representative Test P/N : PFR1212DHE-SP00	<b>Current Test Status</b>	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination

Equipment: 1.Oven: E24-T0164 On/Off Cycles: Every 500 hours

### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A)	Final Test Current Spec. (A)	Deviation (%)	Initial Test Speed Spec. (RPM)	Final Test Speed Spec. (RPM)	Deviation (%)	Initial Test Noise Spec. (dB A)	Final Test Noise Spec. (dB A)	Deviation 3 dBMax.
	<b>5.20 Max.</b>	<b>5.20 Max.</b>		<b>6660-8140</b>	<b>6660-8140</b>		<b>73.5 Max</b>	<b>73.5 Max</b>	
1	3.80	3.78	-0.7	7360	7455	1.3	67.8	66.3	-1.5
2	3.76	3.94	4.8	7274	7672	5.5	68.2	67.1	-1.1
3	3.59	3.89	8.4	7203	7562	5.0	68.5	66.4	-2.1
4	3.70	3.64	-1.7	7345	7361	0.2	68.1	67.0	-1.1
5	3.74	3.74	0.1	7287	7431	2.0	68.4	66.5	-1.9
6	3.87	4.13	6.5	7316	7685	5.0	68.2	66.9	-1.3
7	3.78	3.87	2.5	7498	7574	1.0	67.9	66.6	-1.3
8	4.01	3.95	-1.4	7203	7534	4.6	68.3	66.3	-2.0
9	3.80	3.72	-2.1	7165	7439	3.8	68.6	66.8	-1.8
10	3.92	3.79	-3.3	7112	7185	1.0	68.1	66.3	-1.8
11	4.00	3.73	-6.6	7463	7429	-0.5	68.2	67.1	-1.1
12	3.69	3.50	-5.3	7120	7286	2.3	67.8	66.4	-1.4
13	3.94	4.13	4.8	7408	7685	3.7	68.3	67.0	-1.3
14	4.32	4.13	-4.4	7567	7691	1.6	68.5	66.5	-2.0
15	3.97	3.68	-7.2	7413	7196	-2.9	68.2	66.9	-1.3
16	4.10	3.87	-5.6	7437	7574	1.8	68.6	66.6	-2.0
17	3.80	3.66	-3.6	7204	7461	3.6	68.1	66.8	-1.3
18	4.07	3.76	-7.6	7320	7437	1.6	68.3	66.7	-1.6
19	4.10	3.85	-6.1	7371	7499	1.7	68.0	66.3	-1.7
20	3.83	3.89	1.4	7160	7465	4.3	68.4	66.9	-1.5
21	3.70	3.38	-8.7	7212	7187	-0.3	67.9	66.4	-1.5
22	3.69	3.72	0.9	7219	7439	3.0	68.4	66.6	-1.8
23	3.94	3.68	-6.5	7342	7193	-2.0	67.8	66.5	-1.3
24	3.81	3.73	-2.2	7333	7432	1.4	68.1	66.8	-1.3
25	3.87	4.12	6.5	7277	7688	5.6	68.5	67.1	-1.4
26	3.64	3.37	-7.2	7234	7200	-0.5	67.7	66.4	-1.3
27	3.90	4.12	5.6	7179	7694	7.2	68.3	66.7	-1.6
28	3.74	3.72	-0.6	7253	7431	2.5	68.0	66.3	-1.7
29	3.76	3.74	-0.7	7383	7425	0.6	68.4	67.0	-1.4
30	3.81	3.77	-1.1	7340	7203	-1.9	68.6	66.5	-2.1
31	4.09	3.90	-4.5	7501	7487	-0.2	68.1	66.9	-1.2
32	3.61	3.89	7.9	7261	7495	3.2	67.9	66.8	-1.1
33	3.51	3.73	6.3	7099	7429	4.6	68.5	66.5	-2.0
34	3.83	3.90	1.7	7270	7555	3.9	67.8	66.3	-1.5
35	3.79	4.13	8.9	7392	7674	3.8	68.2	66.8	-1.4

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
<b>DG09FNL059</b>	<b>3375.50</b>	<b>2010/7/2</b>	<b>Nan Yang</b>	<b>Zenny Lei</b>



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<b>Required Test Time (hrs)</b>	<b>Date for Test Beginning</b>	<b>Date for Test Termination</b>	<b>Sample Size (pcs):</b>	<b>Failure (pcs):</b>	<b>Current Total Test Time (hrs)</b>
3,478	2009/5/14 4:00 PM	2010/2/24 5:16 AM	56	0	<b>6478.0</b>
Representative Test P/N : PFR1212DHE-SP00			<b>Current Test Status</b>		<input type="checkbox"/> In process <input type="checkbox"/> In process (exceed requested) <input checked="" type="checkbox"/> Termination

Equipment: 1.Oven: E24-T0164 On/Off Cycles: Every 500 hours

### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) <b>5.20 Max.</b>	Final Test Current Spec. (A) <b>5.20 Max.</b>	Deviation (%)	Initial Test Speed Spec. (RPM) <b>6660-8140</b>	Final Test Speed Spec. (RPM) <b>6660-8140</b>	Deviation (%)	Initial Test Noise Spec. (dB A) <b>73.5 Max</b>	Final Test Noise Spec. (dB A) <b>73.5 Max</b>	Deviation
36	3.96	4.12	4.1	7374	7690	4.3	67.8	66.4	-1.4
37	3.83	3.68	-3.8	7191	7188	0.0	68.1	66.9	-1.2
38	3.88	3.73	-3.8	7254	7432	2.5	68.5	66.5	-2.0
39	3.63	3.66	0.9	7104	7447	4.8	67.8	66.8	-1.0
40	3.83	3.66	-4.5	7207	7442	3.3	68.3	67.0	-1.3
41	3.74	3.67	-2.0	7295	7207	-1.2	67.7	66.8	-0.9
42	3.92	3.72	-5.1	7413	7431	0.2	68.2	66.4	-1.8
43	3.52	3.72	5.7	7051	7692	9.1	67.7	67.0	-0.7
44	4.15	3.93	-5.4	7522	7562	0.5	68.1	66.3	-1.8
45	3.62	3.66	1.0	7136	7456	4.5	68.3	66.8	-1.5
46	3.66	3.37	-7.9	7284	7203	-1.1	68.2	66.4	-1.8
47	3.64	3.66	0.5	7024	7454	6.1	68.5	66.6	-1.9
48	3.80	3.89	2.4	7213	7500	4.0	67.6	66.9	-0.7
49	3.73	3.62	-2.9	7124	7681	7.8	67.9	66.5	-1.4
50	3.87	3.89	0.6	7313	7485	2.4	67.7	67.1	-0.6
51	3.72	3.83	3.1	7131	7698	8.0	68.3	66.6	-1.7
52	3.78	3.74	-1.0	7339	7431	1.3	67.6	66.8	-0.8
53	3.82	3.64	-4.6	7196	7383	2.6	68.1	66.9	-1.2
54	3.69	3.72	0.9	7254	7703	6.2	68.5	66.4	-2.1
55	4.10	3.91	-4.7	7394	7523	1.7	68.1	66.6	-1.5
56	3.78	3.66	-3.2	7335	7451	1.6	68.4	66.9	-1.5
X-Bar	3.824	3.786	-	7279.9	7468.1	-	68.14	66.67	-
σ	0.164	0.183	-	122.714	158.153	-	0.283	0.257	-

<b>QE File No.</b>	<b>Time-out for function test or others (hrs)</b>	<b>Issued Date</b>	<b>Reported By</b>	<b>Approved By</b>
<b>DG09FNL059</b>	<b>3375.50</b>	<b>2010/7/2</b>	<b>Nan Yang</b>	<b>Zenny Lei</b>