



# 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 QFR 80x80x38mm series as the right table	QFR0812UHEYDW				
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<b>Representative Test P/N :QFR0812UHE-CA10</b>
<b>Equipment: 1.Oven: E24-T0161</b>

☉ **L<sub>10</sub> Expectancy: 61,320 hours minimum @ fan rated voltage and the temperature of 45°C**  
 According to the equation for **Weibull distribution**, **MTTF ≅ 7×L10 = 429,240 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 T <sub>s</sub> (°C) (Actual Test Temperature)	Unstress Temperature T <sub>u</sub> (°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 45 °C (hours)	Verified L <sub>10</sub> 45 °C (hours)
70	45	5.66	56	2.303	4,308	19,360.0	1,928,787	275,541

**Test Progress:**

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2015/1/26 10:00 AM	2017/4/22 8:27 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	19360.0

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	7,715,147	1,102,164
30	16.00	5,455,433	779,348
40	8.00	2,727,716	389,674
45	5.66	1,928,787	275,541
50	4.00	1,363,858	194,837
60	2.00	681,929	97,418
70	1.00	340,965	48,709

- 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.

<b>Test Result</b>	<input checked="" type="checkbox"/> <b>Accept</b> <input type="checkbox"/> <b>Reject</b>
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QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG15FNL006	15310.00	2019/1/10	Poppy.Liang	Tim.Yi



## DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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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>
4,308	2015/1/26 10:00 AM	2017/4/22 8:27 PM	56	0	<b>19360.0</b>
Representative Test P/N :QFR0812UHE-CA10			<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-T0161

### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) <b>1.70 Max</b>	Final Test Current Spec. (A) <b>1.70 Max</b>	Deviation (%)	Initial Test Speed Spec. (RPM) <b>8100-9900</b>	Final Test Speed Spec. (RPM) <b>8100-9900</b>	Deviation (%)	Initial Test Noise Spec. (dB A) <b>64.0 Max</b>	Final Test Noise Spec. (dB A) <b>64.0 Max</b>	Deviation <b>3 dBMax.</b>
1	1.08	1.08	-0.8	8791	8687	-1.2	60.1	59.5	-0.6
2	1.07	1.06	-0.7	8744	8644	-1.1	59.5	59.2	-0.3
3	1.12	1.08	-3.2	8850	8744	-1.2	59.6	59.8	0.2
4	1.08	1.05	-3.1	8810	8820	0.1	59.2	59.3	0.1
5	1.12	1.13	0.8	8861	8859	0.0	59.8	60.0	0.2
6	1.10	1.08	-1.8	8805	8745	-0.7	59.3	59.8	0.5
7	1.07	1.05	-1.9	8633	8632	0.0	59.3	59.4	0.1
8	1.11	1.06	-4.4	8709	8593	-1.3	59.5	59.2	-0.3
9	1.13	1.07	-5.2	8816	8920	1.2	59.7	60.6	0.9
10	1.13	1.13	0.0	8843	8889	0.5	59.9	60.2	0.3
11	1.06	1.05	-1.0	8651	8658	0.1	60.1	59.5	-0.6
12	1.11	1.08	-3.2	8836	8788	-0.5	59.2	60.3	1.1
13	1.13	1.17	3.8	8799	8719	-0.9	59.4	60.2	0.8
14	1.15	1.05	-8.3	8891	8609	-3.2	59.6	59.6	0.0
15	1.09	1.10	0.6	8666	8881	2.5	60.1	59.3	-0.8
16	1.11	1.13	1.7	8812	8798	-0.2	59.9	60.0	0.1
17	1.13	1.07	-5.2	8787	8844	0.6	60.1	60.3	0.2
18	1.14	1.05	-7.8	8818	8701	-1.3	59.6	60.4	0.8
19	1.08	1.02	-5.4	8799	8560	-2.7	59.8	60.1	0.3
20	1.08	1.08	-0.3	8689	8671	-0.2	59.3	58.8	-0.5
21	1.10	1.11	1.3	8756	8738	-0.2	59.7	59.9	0.2
22	1.12	1.08	-3.4	8742	8788	0.5	59.4	59.8	0.4
23	1.14	1.13	-0.5	8847	8846	0.0	59.9	59.8	-0.1
24	1.04	1.04	-0.8	8761	8689	-0.8	60.0	59.8	-0.2
25	1.15	1.11	-3.4	8857	8880	0.3	59.2	59.7	0.5
26	1.13	1.10	-2.3	8850	8864	0.2	59.4	60.0	0.6
27	1.11	1.08	-2.1	8737	8694	-0.5	59.6	59.5	-0.1
28	1.15	1.11	-3.6	8804	8800	0.0	59.8	59.6	-0.2
29	1.11	1.10	-1.7	8859	8751	-1.2	60.0	60.1	0.1
30	1.10	1.07	-2.1	8850	8712	-1.6	59.3	60.0	0.7
31	1.13	1.12	-1.1	8855	8769	-1.0	59.5	59.9	0.4
32	1.15	1.12	-2.7	8841	8856	0.2	59.7	60.0	0.3

<b>QE File No.</b>	<b>Time-out for function test or others (hours)</b>	<b>Issued Date</b>	<b>Reported By</b>	<b>Approved By</b>
DG15FNL006	15310.00	2019/1/10	Poppy.Liang	Tim.Yi



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Representative Test P/N :QFR0812UHE-CA10			<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-T0161					

### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) <b>1.70 Max</b>	Final Test Current Spec. (A) <b>1.70 Max</b>	Deviation (%)	Initial Test Speed Spec. (RPM) <b>8100-9900</b>	Final Test Speed Spec. (RPM) <b>8100-9900</b>	Deviation (%)	Initial Test Noise Spec. (dB A) <b>64.0 Max</b>	Final Test Noise Spec. (dB A) <b>64.0 Max</b>	Deviation <b>3 dBMax.</b>
33	1.13	1.07	-5.9	8797	8742	-0.6	60.0	60.1	0.1
34	1.11	1.10	-1.3	8848	8785	-0.7	59.8	59.4	-0.4
35	1.07	1.05	-2.0	8540	8707	2.0	59.2	59.7	0.5
36	1.08	1.06	-2.1	8760	8801	0.5	59.4	60.3	0.9
37	1.08	1.05	-3.0	8729	8733	0.0	59.6	59.6	0.0
38	1.10	1.05	-4.6	8707	8846	1.6	59.8	60.2	0.4
39	1.09	1.06	-3.1	8762	8674	-1.0	60.0	59.1	-0.9
40	1.14	1.11	-3.0	8862	8945	0.9	59.4	60.5	1.1
41	1.13	1.13	-0.3	8905	8874	-0.3	59.2	60.2	1.0
42	1.09	1.08	-1.0	8829	8834	0.1	59.6	60.0	0.4
43	1.17	1.11	-5.1	8834	8895	0.7	59.8	60.1	0.3
44	1.12	1.09	-2.2	8815	8746	-0.8	60.0	60.0	0.0
45	1.14	1.07	-6.9	8774	8797	0.3	59.5	59.2	-0.3
46	1.10	1.15	4.2	8850	8904	0.6	59.7	60.0	0.3
47	1.08	1.05	-2.7	8786	8833	0.5	59.9	59.6	-0.3
48	1.09	1.05	-4.0	8743	8611	-1.5	60.0	59.5	-0.5
49	1.10	1.07	-2.7	8794	8861	0.8	59.2	60.2	1.0
50	1.12	1.10	-1.4	8930	8933	0.0	59.4	59.5	0.1
51	1.10	1.05	-4.1	8737	8758	0.2	59.6	59.3	-0.3
52	1.07	1.08	0.1	8849	8703	-1.6	59.8	59.7	-0.1
53	1.11	1.07	-3.3	8764	8761	0.0	60.0	59.6	-0.4
54	1.07	1.07	-0.1	8780	8689	-1.0	59.3	59.2	-0.1
55	1.09	1.08	-0.8	8828	8816	-0.1	59.5	59.2	-0.3
56	1.21	1.16	-4.3	8979	8779	-2.2	59.7	60.8	1.1
X-Bar	1.11	1.08	-	8795.91	8771.00	-	59.64	59.80	-
$\sigma$	0.03	0.03	-	75.43	92.76	-	0.27	0.42	-

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DG15FNL006	15310.00	2019/1/10	Poppy.Liang	Tim.Yi