



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 80x80x38.0 mm series as the right table	QFR0812UHE			
	QFR0812DE-F00			

Representative Test P/N : QFR0812UHE-SP01

Equipment: 1.Oven: E24-F0109

On/Off Cycles: Every 500 hours

☉ **L₁₀ 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_{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 Ts (°C)	Unstress Temperature Tu (°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	3,478	15,478.0	2,180,764	311,538

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2009/2/11 11:00 AM	2010/6/2 8:46 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	15478.0

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.

Temperature for MTTF Estimation (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	22.63	6,168,132	881,162
30	16.00	4,361,528	623,075
40	8.00	2,180,764	311,538
50	4.00	1,090,382	155,769
60	2.00	545,191	77,884
70	1.00	272,596	38,942

Fan permission criteria for the measurement after test :

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

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

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG09FNL013	7956.00	2011/10/20	Nan Yang	Tim Yi



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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QFR0812UHE				
QFR0812DE-F00				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2009/2/11 11:00 AM	2010/6/2 8:46 PM	56	0	15478.0

Representative Test P/N : QFR0812UHE-SP01	Current Test Status	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination
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Equipment: 1.Oven: E24-F0109 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
	1.70 Max.	1.70 Max.		8100-9900	8100-9900		64.0 Max	64.0 Max	
1	1.21	1.12	-7.4	8875	8868	-0.1	60.7	61.9	1.2
2	1.24	1.14	-7.9	8946	9124	2.0	60.5	62.4	1.9
3	1.17	1.13	-3.4	8943	9019	0.8	60.8	62.1	1.3
4	1.19	1.11	-6.3	8856	9014	1.8	60.7	62.3	1.6
5	1.21	1.12	-7.0	8843	8955	1.3	61.2	61.8	0.6
6	1.13	1.11	-1.9	9014	8804	-2.3	61.1	62.2	1.1
7	1.17	1.08	-7.8	8898	9116	2.4	60.5	62.0	1.5
8	1.20	1.12	-6.7	8971	8986	0.2	60.7	62.3	1.6
9	1.19	1.10	-7.6	9030	9046	0.2	61.1	62.4	1.3
10	1.20	1.06	-11.6	8939	9005	0.7	60.6	61.8	1.2
11	1.18	1.18	-0.5	8981	9043	0.7	61.0	62.4	1.4
12	1.22	1.18	-2.9	8920	8939	0.2	60.9	62.0	1.1
13	1.19	1.11	-6.3	9046	9039	-0.1	60.8	61.9	1.1
14	1.19	1.06	-10.5	8823	8929	1.2	60.5	61.8	1.3
15	1.23	1.16	-5.8	9104	9134	0.3	60.9	62.1	1.2
16	1.17	1.13	-3.3	8953	8972	0.2	60.7	61.8	1.1
17	1.16	1.10	-5.2	8927	8972	0.5	61.2	62.0	0.8
18	1.18	1.12	-4.6	8922	9230	3.5	61.0	61.7	0.7
19	1.23	1.10	-10.1	9052	8912	-1.5	61.4	62.3	0.9
20	1.19	1.13	-5.3	8959	9030	0.8	60.9	62.0	1.1
21	1.19	1.09	-8.2	8943	8991	0.5	61.2	62.0	0.8
22	1.21	1.15	-4.4	8945	8936	-0.1	61.5	62.0	0.5
23	1.16	1.16	0.3	8921	9002	0.9	61.0	61.8	0.8
24	1.21	1.10	-9.5	8955	8898	-0.6	60.9	61.9	1.0
25	1.18	1.12	-5.7	8926	9143	2.4	60.6	62.1	1.5
26	1.21	1.15	-5.1	8900	8926	0.3	61.0	62.3	1.3
27	1.20	1.07	-10.5	8957	9110	1.7	60.7	61.8	1.1
28	1.19	1.15	-3.4	8938	8974	0.4	60.5	62.0	1.5
29	1.22	1.16	-4.4	9001	8996	-0.1	60.9	61.7	0.8
30	1.16	1.11	-4.2	8960	8865	-1.1	60.5	61.7	1.2
31	1.19	1.09	-8.5	8897	8903	0.1	61.2	61.6	0.4
32	1.19	1.15	-3.2	8867	8948	0.9	61.0	61.8	0.8
33	1.19	1.12	-5.6	8988	9162	1.9	60.7	61.9	1.2
34	1.13	1.13	-0.5	8934	9032	1.1	60.5	62.2	1.7
35	1.19	1.16	-3.0	9005	9078	0.8	60.9	61.8	0.9

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
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QFR0812UHE			
QFR0812DE-F00			

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3,478	2009/2/11 11:00 AM	2010/6/2 8:46 PM	56	0	15478.0

Representative Test P/N : QFR0812UHE-SP01	Current Test Status	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination

Equipment: 1.Oven: E24-F0109 On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) 1.70 Max.	Final Test Current Spec. (A) 1.70 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 8100-9900	Final Test Speed Spec. (RPM) 8100-9900	Deviation (%)	Initial Test Noise Spec. (dB A) 64.0 Max	Final Test Noise Spec. (dB A) 64.0 Max	Deviation 3 dBMax.
36	1.20	1.12	-7.0	8998	8983	-0.2	60.6	62.2	1.6
37	1.18	1.13	-4.6	8917	8941	0.3	61.2	62.0	0.8
38	1.19	1.14	-4.2	8970	8977	0.1	61.4	62.0	0.6
39	1.14	1.14	-0.8	8945	9047	1.1	61.0	62.3	1.3
40	1.20	1.13	-6.1	8933	8971	0.4	60.7	62.1	1.4
41	1.19	1.13	-4.6	8951	8992	0.5	61.0	62.4	1.4
42	1.19	1.14	-4.4	8884	8978	1.1	60.8	61.9	1.1
43	1.21	1.12	-7.6	8976	9012	0.4	61.4	61.9	0.5
44	1.22	1.15	-5.2	8884	8902	0.2	60.7	62.1	1.4
45	1.19	1.11	-6.7	8919	8970	0.6	61.2	62.1	0.9
46	1.19	1.15	-3.3	8940	9054	1.3	61.0	61.8	0.8
47	1.18	1.18	-0.1	8914	9045	1.5	60.9	61.8	0.9
48	1.18	1.09	-7.6	8938	9162	2.5	60.8	61.8	1.0
49	1.22	1.10	-9.4	8972	9058	1.0	61.2	62.1	0.9
50	1.20	1.13	-5.7	8963	9087	1.4	61.5	61.6	0.1
51	1.21	1.11	-8.6	8938	9158	2.5	60.8	61.9	1.1
52	1.18	1.17	-0.8	8913	9017	1.2	60.5	62.0	1.5
53	1.22	1.17	-4.0	8975	9016	0.5	60.9	62.4	1.5
54	1.19	1.13	-5.4	8982	9129	1.6	61.2	61.7	0.5
55	1.21	1.10	-8.5	8960	8949	-0.1	61.4	62.3	0.9
56	1.17	1.12	-4.1	8903	8991	1.0	61.0	62.2	1.2
X-Bar	1.191	1.126	-	8944.9	9009.6	-	60.92	62.01	-
σ	0.022	0.028	-	51.250	85.288	-	0.281	0.224	-

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