



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 80x80x25.4 mm series as the right table	QFR0812UH-CX14				
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Representative Test P/N : QFR0812UH-BA31	
Equipment: 1. Oven : E24-F0109	

◎ **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%), and

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 MTF 40 °C (hours)	Verified L ₁₀ 40 °C (hours)
70	40	8.00	56	2.303	3,478	12,480.0	1,758,363	251,195

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2011/7/29 4:30 PM	2012/6/11 1:46 AM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	12480.0

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	4,973,400	710,486
30	16.00	3,516,725	502,389
40	8.00	1,758,363	251,195
45	5.66	1,243,350	177,621
50	4.00	879,181	125,597
60	2.00	439,591	62,799
70	1.00	219,795	31,399

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.

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
DG11FNL093	4139.50	2013/4/20	Chaoping.Duan	Tim.Yi



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)
3,478	2011/7/29 4:30 PM	2012/6/11 1:46 AM	56	0	12480.0

Representative Test P/N : QFR0812UH-BA31	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

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec.	Final Test Current Spec.	Deviation (%)	Initial Test Speed Spec.	Final Test Speed Spec.	Deviation (%)	Initial Test Noise Spec.	Final Test Noise Spec.	Deviation
	(mA) 610 Max.	(mA) 610 Max.		(RPM) 5040-6160	(RPM) 5040-6160		(dB A) 54.5 Max	(dB A) 54.5 Max	
1	546	518	-5.1	5562	5510	-0.9	48.2	49.0	0.8
2	584	558	-4.5	5607	5672	1.2	48.2	49.3	1.1
3	534	513	-3.9	5586	5516	-1.3	48.6	48.8	0.2
4	545	545	0.0	5660	5696	0.6	48.3	49.1	0.8
5	555	547	-1.4	5635	5707	1.3	48.5	48.6	0.1
6	553	528	-4.5	5508	5719	3.8	48.4	48.9	0.5
7	585	553	-5.5	5658	5746	1.6	48.7	49.2	0.5
8	544	515	-5.3	5505	5590	1.5	48.2	49.5	1.3
9	546	516	-5.5	5509	5575	1.2	48.3	49.0	0.7
10	579	536	-7.4	5570	5661	1.6	48.1	49.1	1.0
11	568	553	-2.6	5635	5708	1.3	48.7	48.7	0.0
12	558	520	-6.8	5529	5626	1.8	48.5	49.2	0.7
13	568	556	-2.1	5603	5620	0.3	48.2	49.6	1.4
14	598	553	-7.5	5630	5711	1.4	48.1	49.1	1.0
15	562	554	-1.4	5536	5727	3.5	48.3	48.8	0.5
16	542	538	-0.7	5537	5597	1.1	48.2	49.3	1.1
17	562	538	-4.3	5718	5708	-0.2	48.5	49.0	0.5
18	585	547	-6.5	5709	5753	0.8	48.5	49.5	1.0
19	562	527	-6.2	5654	5678	0.4	48.5	48.9	0.4
20	565	535	-5.3	5609	5706	1.7	48.7	49.2	0.5
21	561	521	-7.1	5613	5663	0.9	48.1	48.8	0.7
22	578	538	-6.9	5512	5625	2.1	48.4	49.4	1.0
23	564	542	-3.9	5632	5679	0.8	48.2	49.0	0.8
24	568	539	-5.1	5632	5674	0.7	48.6	49.1	0.5
25	580	543	-6.4	5617	5692	1.3	48.7	48.9	0.2
26	551	519	-5.8	5478	5631	2.8	48.8	49.5	0.7
27	566	539	-4.8	5626	5698	1.3	48.8	49.0	0.2
28	566	546	-3.5	5584	5717	2.4	48.7	49.3	0.6
29	563	542	-3.7	5628	5628	0.0	48.3	49.1	0.8
30	586	544	-7.2	5575	5703	2.3	48.5	48.9	0.4
31	557	533	-4.3	5566	5709	2.6	48.3	49.0	0.7
32	574	545	-5.1	5663	5671	0.1	48.2	49.6	1.4

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG11FNL093	4139.50	2013/4/20	Chaoping.Duan	Tim.Yi



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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QFR0812UH-CX14				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2011/7/29 4:30 PM	2012/6/11 1:46 AM	56	0	12480.0

Representative Test P/N : QFR0812UH-BA31	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

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (mA) 610 Max.	Final Test Current Spec. (mA) 610 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 5040-6160	Final Test Speed Spec. (RPM) 5040-6160	Deviation (%)	Initial Test Noise Spec. (dB A) 54.5 Max	Final Test Noise Spec. (dB A) 54.5 Max	Deviation 3 dBMax.
33	559	523	-6.4	5518	5570	0.9	48.0	48.7	0.7
34	573	543	-5.2	5622	5643	0.4	48.7	49.2	0.5
35	575	544	-5.4	5652	5712	1.1	48.4	49.5	1.1
36	567	528	-6.9	5585	5718	2.4	48.6	49.0	0.4
37	560	562	0.4	5613	5717	1.9	48.0	48.8	0.8
38	574	547	-4.7	5654	5763	1.9	48.6	49.4	0.8
39	578	551	-4.7	5627	5741	2.0	48.7	48.9	0.2
40	587	543	-7.5	5704	5639	-1.1	48.6	48.6	0.0
41	567	527	-7.1	5628	5613	-0.3	48.2	49.1	0.9
42	553	528	-4.5	5526	5630	1.9	48.3	48.8	0.5
43	556	533	-4.1	5632	5615	-0.3	48.5	49.4	0.9
44	567	554	-2.3	5518	5648	2.4	48.4	48.9	0.5
45	573	536	-6.5	5638	5583	-1.0	48.5	49.5	1.0
46	552	528	-4.3	5555	5649	1.7	48.3	49.2	0.9
47	566	558	-1.4	5647	5632	-0.3	48.2	49.3	1.1
48	565	527	-6.7	5551	5570	0.3	48.7	48.7	0.0
49	567	550	-3.0	5573	5645	1.3	48.2	49.4	1.2
50	558	535	-4.1	5607	5628	0.4	48.5	49.1	0.6
51	545	529	-2.9	5505	5573	1.2	48.5	48.9	0.4
52	548	527	-3.8	5607	5644	0.7	48.5	49.5	1.0
53	569	555	-2.5	5590	5665	1.3	48.6	49.0	0.4
54	565	523	-7.4	5627	5613	-0.2	48.2	49.2	1.0
55	575	548	-4.7	5679	5733	1.0	48.6	48.8	0.2
56	561	536	-4.5	5545	5695	2.7	48.7	49.1	0.4
X-Bar	564.6	538.1	-	5598.0	5659.9	-	48.43	49.10	-
σ	13.030	12.563	-	57.171	58.237	-	0.217	0.267	-

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