



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 60x60x25.4 mm series as the right table	QFR0612GH-SP04	QFR0612GH-BF00	QFR0612UH-SP11		
	QFR0612GH-SP03	QFR0612GH	QFR0612DHX03		
	QFR0612DH	QFR0612EH	QFR0612DH-BF00		
	QFR0612UH	QFR0612UH-SP19			

Representative Test P/N : QFR0612DH-SP00

Equipment: 1. Oven: E24-F0107	On/Off Cycles: Every 500 hours
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☉ **L₁₀ Expectancy: 70,000 hours minimum @ fan rated voltage and the temperature of 40°C**

According to the equation for **Weibull distribution**, $MTTF \doteq 7 \times L_{10} = 490,000$ 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,

$$t = 1.036 \times MTTF \times [(B_{r,c}) \div n]^{0.91} \div A_F, \text{ and } A_F = 2^{(T_s - T_u)/10}$$

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 T _s (°C)	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 40 °C (hours)	Verified L ₁₀ 40 °C (hours)
70	40	8.00	56	2.303	3,478	20,360.0	2,868,611	409,802

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2007/5/23 4:00 PM	2010/1/12 4:16 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	20360.0

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	8,113,657	1,159,094
30	16.00	5,737,222	819,603
40	8.00	2,868,611	409,802
45	5.66	2,028,414	289,773
50	4.00	1,434,305	204,901
60	2.00	717,153	102,450
70	1.00	358,576	51,225

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
DG07FNL093	19682.50	2012/2/15	Nan.Yang	Tim Yi



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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QFR0612GH-SP04	QFR0612GH-BF00	QFR0612UH-SP11		
QFR0612GH-SP03	QFR0612GH	QFR0612DHX03		
QFR0612DH	QFR0612EH	QFR0612DH-BF00		
QFR0612UH	QFR0612UH-SP19			

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2007/5/23 4:00 PM	2010/1/12 4:16 PM	56	0	20360.0

Representative Test P/N : QFR0612DH-SP00	Current Test Status	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination

Equipment: 1. Oven: E24-F0107 On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (mA)	Final Test Current Spec. (mA)	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
	1100	1100		9540-11660	9540-11660		58.5 Max	58.5 Max	3 dB Max
1	799	778	-2.6	10792	10856	0.6	54.3	53.0	-1.3
2	798	751	-5.9	10625	10705	0.8	54.7	52.1	-2.6
3	842	772	-8.3	10686	11043	3.3	53.9	52.4	-1.5
4	818	754	-7.8	10506	10865	3.4	54.2	52.0	-2.2
5	785	730	-7.0	10554	10652	0.9	54.7	51.9	-2.8
6	860	785	-8.7	10812	10685	-1.2	54.0	52.3	-1.7
7	811	764	-5.8	10404	10890	4.7	53.8	51.8	-2.0
8	809	770	-4.8	10497	10962	4.4	54.6	52.2	-2.4
9	771	706	-8.4	10498	10558	0.6	54.1	52.4	-1.7
10	806	781	-3.1	10625	10814	1.8	54.3	51.7	-2.6
11	833	781	-6.2	10764	10837	0.7	53.9	52.3	-1.6
12	784	785	0.1	10486	11034	5.2	54.5	52.0	-2.5
13	849	760	-10.5	10719	10793	0.7	54.1	51.9	-2.2
14	843	789	-6.4	10715	10829	1.1	54.7	52.4	-2.3
15	776	714	-8.0	10515	10654	1.3	54.0	52.1	-1.9
16	826	759	-8.1	10682	10737	0.5	54.2	51.9	-2.3
17	774	732	-5.4	10519	10707	1.8	54.8	51.7	-3.1
18	830	745	-10.2	10669	10764	0.9	54.1	52.0	-2.1
19	806	817	1.4	10748	10978	2.1	54.6	52.3	-2.3
20	845	800	-5.3	10556	11054	4.7	54.2	52.1	-2.1
21	790	754	-4.6	10485	10518	0.3	54.5	51.8	-2.7
22	834	779	-6.6	10760	10915	1.4	54.7	52.2	-2.5
23	825	811	-1.7	10931	10993	0.6	53.8	52.5	-1.3
24	789	738	-6.5	10662	10763	0.9	54.2	52.1	-2.1
25	788	732	-7.1	10603	10766	1.5	54.7	52.4	-2.3
26	779	721	-7.4	10551	10682	1.2	54.0	51.9	-2.1
27	822	754	-8.3	10716	11016	2.8	54.5	52.0	-2.5
28	770	742	-3.6	10639	10904	2.5	54.1	52.3	-1.8
29	817	771	-5.6	10746	10883	1.3	54.7	51.9	-2.8
30	814	757	-7.0	10712	10831	1.1	54.1	51.7	-2.4
31	786	737	-6.2	10501	10784	2.7	54.5	52.4	-2.1
32	839	782	-6.8	10664	10922	2.4	53.9	51.8	-2.1
33	828	776	-6.3	10694	10930	2.2	54.6	52.2	-2.4
34	836	787	-5.9	10646	10586	-0.6	54.2	51.7	-2.5
35	828	757	-8.6	10686	11010	3.0	54.8	52.5	-2.3

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG07FNL093	19682.50	2012/2/15	Nan.Yang	Tim Yi



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	1100	1100		9540-11660	9540-11660		58.5 Max	58.5 Max	3 dB Max
36	814	757	-7.0	10681	10873	1.8	54.3	52.5	-1.8
37	877	791	-9.8	10963	10797	-1.5	54.9	51.9	-3.0
38	778	755	-3.0	10553	10912	3.4	54.5	52.0	-2.5
39	848	780	-8.0	10928	10685	-2.2	54.1	52.1	-2.0
40	810	774	-4.4	10809	10745	-0.6	54.7	52.5	-2.2
41	783	744	-5.0	10628	10689	0.6	54.1	52.2	-1.9
42	894	836	-6.5	11115	11302	1.7	54.3	52.3	-2.0
43	800	741	-7.4	10533	10760	2.2	54.9	51.8	-3.1
44	844	756	-10.4	10654	10952	2.8	54.5	51.7	-2.8
45	844	769	-8.9	11083	10895	-1.7	54.2	52.0	-2.2
46	857	798	-6.9	10816	10994	1.6	53.7	52.3	-1.4
47	823	766	-6.9	10593	10767	1.6	54.8	52.1	-2.7
48	811	785	-3.2	10688	10725	0.3	54.2	52.5	-1.7
49	863	820	-5.0	11090	11242	1.4	54.5	51.8	-2.7
50	836	761	-9.0	11024	10920	-0.9	54.1	51.9	-2.2
51	817	796	-2.6	10602	10758	1.5	54.9	52.1	-2.8
52	810	789	-2.6	10730	10825	0.9	54.5	52.4	-2.1
53	846	804	-5.0	10959	11023	0.6	55.1	52.0	-3.1
54	881	810	-8.1	10892	11147	2.3	54.8	51.9	-2.9
55	829	763	-8.0	10723	10992	2.5	54.3	52.2	-2.1
56	835	769	-7.9	10553	11002	4.3	55.0	52.9	-2.1
X-Bar	819.8	768.5	-	10696.2	10855.8	-	54.38	52.13	-
σ	29.177	27.025	-	166.042	158.855	-	0.345	0.292	-

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