

DC FAN LIFE EXPERIMENT REPORT

Available for these models with lower speed and same physical structure. All model may be followed byRxx orFxx series suffixes. This test report applies to QFR 80x80x25.0mm series as the right table					
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Representative Test P/N : QFR0812GJ-00P0

Equipment: 1.Oven: E24-T0161

On/Off Cycles: Every 500 hours

◎ **L₁₀ Expectancy: 70,000 hours minimum @ fan rated voltage and the temperature of 40℃**

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,

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

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 (℃) (Actual Test Temperature)	Unstress Temperature Tu (℃)	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 ℃ (hours)	Verified L ₁₀ 40 ℃ (hours)
80	40	16.00	56	2.303	1,739	3,739.0	1,053,609	150,516

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2020/6/9 4:00 PM	2020/9/1 11:53 PM	☐ In process	☒ In process (exceed requested)	☐ Termination	3739.0

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 (℃)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	45.25	2,980,055	425,722
30	32.00	2,107,217	301,031
40	16.00	1,053,609	150,516
50	8.00	526,804	75,258
60	4.00	263,402	37,629
70	2.00	131,701	18,814
80	1.00	65,851	9,407

Fan permission criteria for the measurement after test :

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

Test Result

☒ **Accept**
☐ **Reject**

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG20FNL040	1333.00	2021/1/7	Loly.Wang	Tim.Yi

BGN (dBA) : 15.8

Temp (℃) : 21.0



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)				
1,739	2020/6/9 4:00 PM	2020/9/1 11:53 PM	56	0	3739.0				
Representative Test P/N : QFR0812GJ-00P0			Current Test Status		☐ In process	☒ In process (exceed requested)	☐ Termination		
Equipment: 1.Oven: E24-T0161					On/Off Cycles: Every 500 hours				
Test Data Between Initial Test and Final Test									
Sample No.	Initial Test Current Spec. (A) 1.12 Max.	Final Test Current Spec. (A) 1.12 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 7200-8800	Final Test Speed Spec. (RPM) 7200-8800	Deviation (%)	Initial Test Noise Spec. (dB A) 60.5 Max	Final Test Noise Spec. (dB A) 60.5 Max	Deviation 3 dBMax.
1	0.92	0.93	1.4	7893	7786	-1.4	56.2	56.0	-0.2
2	0.94	0.91	-3.5	7895	7583	-4.0	56.0	56.1	0.1
3	0.93	0.90	-3.4	7884	7669	-2.7	55.8	55.2	-0.6
4	0.90	0.90	0.2	7889	7638	-3.2	56.1	55.5	-0.6
5	0.89	0.93	4.4	7854	7780	-0.9	55.7	55.7	0.0
6	0.90	0.92	2.4	7813	7527	-3.7	55.6	55.7	0.1
7	0.89	0.89	0.2	7866	7695	-2.2	55.6	56.3	0.7
8	0.92	0.89	-3.9	7780	7601	-2.3	56.0	55.3	-0.7
9	0.90	0.92	2.1	8043	7518	-6.5	56.2	55.6	-0.6
10	0.93	0.93	0.5	7907	7732	-2.2	55.5	55.8	0.3
11	0.90	0.88	-1.9	7825	7722	-1.3	55.8	55.4	-0.4
12	0.93	0.89	-3.9	7907	7563	-4.4	55.8	55.6	-0.2
13	0.92	0.91	-1.1	7960	7539	-5.3	56.4	56.4	0.0
14	0.90	0.92	2.3	7757	7788	0.4	55.6	55.5	-0.1
15	0.91	0.88	-3.7	7871	7725	-1.9	55.8	56.3	0.5
16	0.89	0.89	0.3	7799	7592	-2.7	55.7	56.8	1.1
17	0.85	0.91	6.7	7472	7573	1.4	55.7	56.2	0.5
18	0.95	0.91	-3.7	7902	7829	-0.9	55.8	56.0	0.2
19	0.89	0.89	-0.4	7894	7688	-2.6	55.7	56.0	0.3
20	0.90	0.88	-1.9	7886	7566	-4.1	55.2	55.9	0.7
21	0.86	0.90	4.4	7687	7617	-0.9	56.1	55.4	-0.7
22	0.95	0.92	-2.3	7923	7784	-1.8	56.3	56.2	-0.1
23	0.88	0.89	1.5	8136	7682	-5.6	56.0	56.0	0.0
24	0.91	0.89	-1.9	7877	7583	-3.7	56.2	56.0	-0.2
25	0.90	0.91	1.6	7840	7558	-3.6	55.7	55.7	0.0
26	0.89	0.92	3.1	7758	7788	0.4	56.0	55.5	-0.5
27	0.92	0.89	-3.3	7923	7679	-3.1	55.8	55.2	-0.6
28	0.86	0.89	3.1	7832	7573	-3.3	55.3	55.5	0.2
29	0.91	0.95	4.0	7925	7681	-3.1	55.5	55.4	-0.1
30	0.92	0.90	-1.3	7882	7591	-3.7	56.1	56.5	0.4
31	0.94	0.89	-5.3	7917	7704	-2.7	56.0	55.6	-0.4
32	0.91	0.89	-2.6	7859	7571	-3.7	55.8	55.2	-0.6
QE File No.	Time-out for function test or others (hours)		Issued Date		Reported By		Approved By		
DG20FNL040	1333.00		2021/1/7		Loly.Wang		Tim.Yi		



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33	0.88	0.93	6.3	7736	7712	-0.3	55.3	56.0	0.7
34	0.90	0.91	1.1	7879	7570	-3.9	55.7	55.2	-0.5
35	0.92	0.89	-3.9	7884	7696	-2.4	55.6	55.4	-0.2
36	0.82	0.88	7.8	8333	7604	-8.7	55.8	55.2	-0.6
37	0.90	0.91	0.8	7884	7810	-0.9	55.7	55.8	0.1
38	0.94	0.90	-4.3	7891	7609	-3.6	55.9	55.7	-0.2
39	0.92	0.87	-5.4	7701	7655	-0.6	56.0	55.8	-0.2
40	0.89	0.93	4.3	7872	7534	-4.3	55.6	55.3	-0.3
41	0.85	0.92	8.3	8142	7803	-4.2	55.5	55.5	0.0
42	0.89	0.92	3.6	7737	7527	-2.7	55.6	55.6	0.0
43	0.94	0.89	-5.2	7927	7577	-4.4	56.0	56.0	0.0
44	0.87	0.88	1.3	7846	7724	-1.6	56.0	55.5	-0.5
45	0.89	0.90	1.7	8133	7620	-6.3	55.6	55.7	0.1
46	0.86	0.91	5.6	7786	7823	0.5	55.4	55.3	-0.1
47	0.92	0.90	-2.0	7883	7653	-2.9	56.3	56.2	-0.1
48	0.87	0.90	3.3	7748	7542	-2.7	55.7	55.8	0.1
49	0.90	0.89	-0.8	7747	7599	-1.9	55.6	56.3	0.7
50	0.87	0.91	5.5	7659	7809	2.0	55.6	56.0	0.4
51	0.93	0.91	-2.0	7835	7607	-2.9	55.5	56.0	0.5
52	0.97	0.90	-7.0	8006	7589	-5.2	56.2	55.8	-0.4
53	0.92	0.90	-1.7	7932	7850	-1.0	56.0	55.7	-0.3
54	0.91	0.90	-1.9	7857	7647	-2.7	55.9	55.9	0.0
55	0.84	0.90	6.3	8523	7540	-11.5	55.8	55.4	-0.4
56	0.92	0.91	-0.7	7932	7798	-1.7	56.2	56.4	0.2
X-Bar	0.90	0.90	-	7884.45	7657.55	-	55.81	55.77	-
σ	0.03	0.02	-	154.71	95.00	-	0.26	0.38	-
QE File No.	Time-out for function test or others (hrs)		Issued Date		Reported By		Approved By		
DG20FNL040	1333.00		2021/1/7		Loly.Wang		Tim.Yi		