



DC FAN CUSTOMIZED 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 60x60x25.0 mm series as the right table

Representative Test P/N : QFR0624DH

Equipment: 1.Oven: E24-F0108

On/Off Cycles: Every 500 hours

© **L₁₀ Expectancy: 100,000 hours minimum @ fan rated voltage and the temperature of 60°C**

According to the equation for **Weibull distribution**,

$$MTTF \doteq 1.89 \times L_{10} = 189,000 \text{ hours}$$

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,

$$t = 1.119 \times MTTF \times [(B_{r,c}) \div n]^{0.33} \div A_F, \text{ and } A_F = 1.5^{(T_s - T_u)/10}$$

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) (Actual Test Temperature)	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 60 °C (hours)	Verified L ₁₀ 60 °C (hours)
85	60	2.76	54	2.303	27,098	11,360.0	79,234	41,923

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2014/11/6 4:30 PM	2019/5/14 5:35 PM	<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination	11360.0

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.)

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 Method according to IPC-9591.

Temperature for MTTF Estimation (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	11.39	327,513	173,287
30	9.30	267,413	141,489
40	6.20	178,276	94,326
50	4.13	118,850	62,884
55	3.38	97,041	51,344
60	2.76	79,234	41,923
70	1.84	52,822	27,948
80	1.22	35,215	18,632
85	1.00	28,753	15,213
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
DG14FNL143	12503.50	2017/7/28	NaNa.Wang	Tim.Yi

BGN (dBA) :16.8

Temp (°C) : 26.2



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)
27,098	2014/11/6 4:30 PM	2019/5/14 5:35 PM	54	0	11360.0
Representative Test P/N : QFR0624DH			Current Test Status		<input checked="" type="checkbox"/> In process <input type="checkbox"/> In process (exceed requested) <input type="checkbox"/> Termination
Equipment: 1.Oven: E24-F0108				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 3 dBMax.
	0.55 Max.	0.55 Max.		9540-11660	9540-11660		59.0 Max	59.0 Max	
1	0.272	0.305	12.1	9755	10075	3.3	53.1	52.1	-1.0
2	0.297	0.323	8.8	10340	10434	0.9	53.6	52.2	-1.4
3	0.304	0.319	4.9	10252	10441	1.8	53.0	51.9	-1.1
4	0.299	0.329	10.0	10228	10475	2.4	53.9	52.4	-1.5
5	0.294	0.296	0.7	10031	10085	0.5	53.5	53.6	0.1
6	0.295	0.303	2.7	10051	10202	1.5	53.8	52.2	-1.6
7	0.322	0.343	6.5	10503	10712	2.0	53.1	54.1	1.0
8	0.293	0.323	10.2	10225	10410	1.8	53.3	51.9	-1.4
9	0.285	0.281	-1.4	10040	9859	-1.8	53.5	53.8	0.3
10	0.301	0.315	4.7	10243	10279	0.4	53.7	52.1	-1.6
11	0.283	0.263	-7.1	10040	9648	-3.9	53.9	52.9	-1.0
12	0.288	0.326	13.2	10376	10291	-0.8	53.1	52.4	-0.7
13	0.303	0.328	8.3	10103	10573	4.7	53.3	52.0	-1.3
14	0.295	0.330	11.9	10297	10445	1.4	53.5	52.0	-1.5
15	0.299	0.341	14.0	10285	10747	4.5	53.7	53.1	-0.6
16	0.296	0.333	12.5	9909	10559	6.6	53.9	52.9	-1.0
17	0.297	0.310	4.4	10263	10281	0.2	53.1	52.8	-0.3
18	0.269	0.287	6.7	9793	9872	0.8	53.3	53.1	-0.2
19	0.302	0.331	9.6	10688	10555	-1.2	53.5	52.8	-0.7
20	0.306	0.338	10.5	10404	10580	1.7	53.7	53.2	-0.5
21	0.301	0.271	-10.0	10055	9906	-1.5	53.9	51.8	-2.1
22	0.311	0.333	7.1	10503	10677	1.7	53.1	53.2	0.1
23	0.309	0.332	7.4	10287	10654	3.6	53.3	53.1	-0.2
24	0.320	0.335	4.7	10364	10597	2.2	53.5	53.3	-0.2
25	0.276	0.263	-4.7	9580	9562	-0.2	53.0	51.9	-1.1
26	0.290	0.323	11.4	10481	10364	-1.1	53.7	51.8	-1.9
27	0.327	0.353	8.0	10687	10946	2.4	53.9	54.8	0.9
28	0.308	0.330	7.1	10408	10557	1.4	53.2	52.7	-0.5
29	0.294	0.273	-7.1	9999	9849	-1.5	53.4	53.6	0.2
30	0.303	0.334	10.2	10294	10607	3.0	53.3	52.9	-0.4
31	0.303	0.324	6.9	10348	10528	1.7	53.7	52.1	-1.6
32	0.269	0.300	11.5	10004	10142	1.4	53.2	53.1	-0.1

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG14FNL143	12503.50	2017/7/28	NaNa.Wang	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)				
27,098	2014/11/6 4:30 PM	2019/5/14 5:35 PM	54	0	11360.0				
Representative Test P/N : QFR0624DH			Current Test Status	<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination			
Equipment: 1.Oven: E24-F0108				On/Off Cycles: Every 500 hours					
Test Data Between Initial Test and Final Test									
Sample No.	Initial Test Current Spec. (A) 0.55 Max.	Final Test Current Spec. (A) 0.55 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 9540-11660	Final Test Speed Spec. (RPM) 9540-11660	Deviation (%)	Initial Test Noise Spec. (dB A) 59.0 Max	Final Test Noise Spec. (dB A) 59.0 Max	Deviation 3 dBMax.
33	0.318	0.301	-5.3	10478	10158	-3.1	53.4	54.4	1.0
34	0.317	0.335	5.7	10455	10608	1.5	53.0	53.2	0.2
35	0.293	0.321	9.6	10228	10601	3.6	53.2	51.8	-1.4
36	0.294	0.329	11.9	10109	10542	4.3	53.4	52.1	-1.3
37	0.311	0.293	-5.8	10456	9919	-5.1	53.6	53.4	-0.2
38	0.337	0.333	-1.2	10750	10551	-1.9	53.8	53.6	-0.2
39	0.305	0.343	12.5	10437	10668	2.2	53.0	53.4	0.4
40	0.312	0.338	8.3	10299	10559	2.5	53.2	53.0	-0.2
41	0.306	0.349	14.1	10610	10713	1.0	53.4	51.0	-2.4
42	0.309	0.340	10.0	10841	10679	-1.5	53.6	54.6	1.0
43	0.298	0.332	11.4	10055	10542	4.8	53.8	52.9	-0.9
44	0.292	0.298	2.1	10209	10167	-0.4	53.0	53.0	0.0
45	0.289	0.326	12.8	10010	10364	3.5	53.2	52.1	-1.1
46	0.307	0.321	4.6	10354	10348	-0.1	53.4	52.3	-1.1
47	0.294	0.312	6.1	10257	10295	0.4	53.6	52.4	-1.2
48	0.293	0.328	11.9	10104	10486	3.8	53.8	52.0	-1.8
49	0.313	0.336	7.3	10435	10542	1.0	53.0	52.9	-0.1
50	0.291	0.300	3.1	10211	10188	-0.2	53.2	52.6	-0.6
51	0.316	0.341	7.9	10401	10658	2.5	53.4	53.8	0.4
52	0.312	0.327	4.8	10526	10538	0.1	53.6	52.1	-1.5
53	0.305	0.336	10.2	10154	10526	3.7	53.8	52.4	-1.4
54	0.300	0.329	9.7	10096	10477	3.8	53.1	52.1	-1.0
X-Bar	0.300	0.320	-	10265.02	10389.65	-	53.43	52.76	-
σ	0.013	0.022	-	238.04	292.08	-	0.29	0.76	-
QE File No.	Time-out for function test or others (hrs)		Issued Date		Reported By		Approved By		
DG14FNL143	12503.50		2017/7/28		NaNa.Wang		Tim.Yi		