

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 QFR92x92x25.4 mm series as the right table	QFR0912VH-F00				
	QFR0912VH-R00				

Representative Test P/N : QFR0912VH-SP00

Equipment: 1. Oven: E24-F0035

On/Off Cycles: Every 500 hours

☉ **L₁₀ Expectancy: 50,000 hours minimum @ fan rated voltage and the temperature of 40 °C**

According to the equation for **Weibull distribution**, **MTTF $\cong$ 7×L₁₀ = 350,000 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 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 MTTF 40 °C (hours)	Verified L ₁₀ 40 °C (hours)
70	40	8.00	56	2.303	2,484	12,360.0	1,741,455	248,779

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2006/11/21 2:30 PM	2007/11/20 6:07 AM	☐ In process	☐ In process (exceed requested)	☒ Termination	12360.0

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 >3dB over the original measure noise.

Temperature for MTTF Estimation (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	22.63	4,925,579	703,654
30	16.00	3,482,911	497,559
40	8.00	1,741,455	248,779
50	4.00	870,728	124,390
60	2.00	435,364	62,195
70	1.00	217,682	31,097
Test Result		☒ Accept	
		☐ Reject	

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG06FNL235	6243.50	2009/1/4	Nan.Yang	Zenny Lei



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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applies to QFR92x92x25.4 mm series as the right table

QFR0912VH-F00				
QFR0912VH-R00				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
2,484	2006/11/21 2:30 PM	2007/11/20 6:07 AM	56	0	12360.0
Representative Test P/N : QFR0912VH-SP00			Current Test Status	☐ In process	☐ In process (exceed requested) ☒ Termination
Equipment: 1. Oven: E24-F0035				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 3 dB Max
	600 Max	600 Max		3780-4620	3780-4620		49.0Max	49.0Max	
1	413	417	1.0	4275	4202	-1.7	44.7	45.3	0.6
2	411	423	2.9	4304	4260	-1.0	44.2	45.6	1.4
3	420	409	-2.6	4276	4241	-0.8	44.5	45.3	0.8
4	413	413	0.0	4292	4203	-2.1	44.3	45.7	1.4
5	414	425	2.7	4241	4225	-0.4	44.6	45.5	0.9
6	416	407	-2.2	4324	4241	-1.9	44.4	45.3	0.9
7	420	421	0.2	4283	4239	-1.0	44.1	45.6	1.5
8	418	411	-1.7	4246	4213	-0.8	44.5	45.4	0.9
9	405	419	3.5	4201	4247	1.1	44.3	45.3	1.0
10	421	410	-2.6	4307	4222	-2.0	44.4	45.8	1.4
11	423	420	-0.7	4258	4244	-0.3	44.4	45.3	0.9
12	410	416	1.5	4230	4223	-0.2	44.1	45.6	1.5
13	408	422	3.4	4255	4253	0.0	44.6	45.7	1.1
14	409	425	3.9	4258	4221	-0.9	44.2	45.2	1.0
15	412	409	-0.7	4212	4245	0.8	44.5	45.8	1.3
16	415	421	1.4	4221	4236	0.4	44.1	45.1	1.0
17	421	409	-2.9	4314	4245	-1.6	44.6	45.7	1.1
18	422	418	-0.9	4285	4244	-1.0	44.0	45.4	1.4
19	425	412	-3.1	4361	4210	-3.5	44.3	45.6	1.3
20	416	421	1.2	4259	4236	-0.5	44.5	45.2	0.7
21	416	415	-0.2	4253	4207	-1.1	44.2	45.8	1.6
22	416	420	1.0	4261	4224	-0.9	44.3	45.5	1.2
23	425	411	-3.3	4342	4220	-2.8	44.7	45.3	0.6
24	422	416	-1.4	4336	4273	-1.5	44.4	45.7	1.3
25	407	417	2.5	4213	4204	-0.2	44.2	45.1	0.9
26	410	420	2.4	4265	4245	-0.5	44.5	45.4	0.9
27	421	416	-1.2	4253	4205	-1.1	44.3	45.8	1.5
28	417	414	-0.7	4212	4211	0.0	44.6	45.6	1.0
29	404	423	4.7	4248	4225	-0.5	44.3	45.5	1.2
30	413	421	1.9	4259	4246	-0.3	44.5	45.1	0.6
31	425	413	-2.8	4295	4229	-1.5	44.1	45.6	1.5
32	422	424	0.5	4296	4229	-1.6	44.4	45.3	0.9
33	416	419	0.7	4272	4194	-1.8	44.2	45.6	1.4
34	414	424	2.4	4289	4209	-1.9	44.4	45.7	1.3
35	431	412	-4.4	4207	4225	0.4	44.2	45.4	1.2

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG06FNL235	6243.50	2009/1/4	Nan.Yang	Zenny Lei



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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applies to QFR92x92x25.4 mm series as the right table

QFR0912VH-F00				
QFR0912VH-R00				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
2,484	2006/11/21 2:30 PM	2007/11/20 6:07 AM	56	0	12360.0

Representative Test P/N : QFR0912VH-SP00	Current Test Status	☐ In process	☐ In process (exceed requested)	☒ Termination
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Equipment: 1. Oven: E24-F0035	On/Off Cycles: Every 500 hours
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Test Data Between Initial Test and Final Test

Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation
	Current Spec.	Current Spec.		Speed Spec.	Speed Spec.		Noise Spec.	Noise Spec.	
	(mA) 600 Max	(mA) 600 Max		(RPM) 3780-4620	(RPM) 3780-4620		(dB A) 49.0Max	(dB A) 49.0Max	
36	410	422	2.9	4372	4227	-3.3	44.3	45.1	0.8
37	420	417	-0.7	4311	4194	-2.7	44.4	45.2	0.8
38	411	427	3.9	4324	4181	-3.3	44.0	45.6	1.6
39	419	416	-0.7	4220	4190	-0.7	44.3	45.3	1.0
40	414	426	2.9	4280	4220	-1.4	44.5	45.5	1.0
41	415	420	1.2	4282	4207	-1.8	44.2	45.7	1.5
42	417	422	1.2	4258	4229	-0.7	44.0	45.2	1.2
43	417	417	0.0	4308	4198	-2.6	44.4	45.8	1.4
44	417	421	1.0	4350	4256	-2.2	44.3	45.4	1.1
45	412	417	1.2	4282	4217	-1.5	44.1	45.6	1.5
46	401	420	4.7	4280	4252	-0.7	44.5	45.3	0.8
47	418	412	-1.4	4262	4248	-0.3	44.2	46.0	1.8
48	416	418	0.5	4305	4199	-2.5	44.4	45.7	1.3
49	416	423	1.7	4266	4221	-1.1	44.3	45.4	1.1
50	415	410	-1.2	4275	4244	-0.7	44.1	45.7	1.6
51	410	417	1.7	4244	4257	0.3	44.4	45.5	1.1
52	427	412	-3.5	4327	4365	0.9	44.4	45.2	0.8
53	415	418	0.7	4234	4328	2.2	44.2	45.5	1.3
54	418	423	1.2	4294	4425	3.1	44.5	45.3	0.8
55	413	410	-0.7	4244	4322	1.8	44.1	45.1	1.0
56	408	417	2.2	4261	4289	0.7	44.3	45.6	1.3
X-Bar	415.7	417.5	-	4274.7	4236.9	-	44.33	45.47	-
σ	5.901	5.063	-	39.654	42.115	-	0.178	0.225	-

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DG06FNL235	6243.50	2009/1/4	Nan.Yang	Zenny Lei