



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 QFR80x80x25.4mm series as the right table	QFR0812SH-8S30			
	QFR0812SH-AK1U			
	QFR0824SH-DT50			
	QFR0824SH-8E88			

Representative Test P/N : QFR0812SH-SP00
Equipment: 1.Oven: E24-W520

☉ **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 MTTF 40 °C (hours)	Verified L ₁₀ 40 °C (hours)
70	40	8.00	56	2.303	3,478	9,497.0	1,338,074	191,153

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2006/12/7 10:00 AM	2007/6/14 12:46 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	9497.0

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	3,784,646	540,664
30	16.00	2,676,149	382,307
40	8.00	1,338,074	191,153
50	4.00	669,037	95,577
60	2.00	334,519	47,788
70	1.00	167,259	23,894

Fan permission criteria for the measurement after test :

- Speed can not drop of ≥ 15% below the original measured rpm.
- Current cannot increase > 15% of original measure current.
- 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
WJQFML-2006097	1061.00	2008/2/20 8:00 AM	XINHONG.YANG	ANGLER.LIU



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QFR0812SH-8S30			
QFR0812SH-AK1U			
QFR0824SH-DT50			
QFR0824SH-8E88			

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination (at least)	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2006/12/7 10:00 AM	2007/6/14 12:46 PM	56	0	9497.0

Representative Test P/N : QFR0812SH-SP00	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-W520

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. (mA)	Current Spec. (mA)		Speed Spec. (RPM)	Speed Spec. (RPM)		Noise Spec. (dB A)	Noise Check. (dB A)	
	400max.	400max.	15% Max	4300REF	4300REF	15% Max	45.6max.	45.6max.	3 dB Max
1	307	289	-5.9	4321	4272	-1.1	44.1	44.2	0.1
2	305	300	-1.6	4266	4249	-0.4	44.1	44.5	0.4
3	306	302	-1.3	4243	4231	-0.3	44.3	44.3	0.0
4	300	284	-5.3	4212	4365	3.6	44.2	43.9	-0.3
5	302	293	-3.0	4224	4279	1.3	43.7	44.7	1.0
6	285	299	4.9	4157	4256	2.4	43.2	44.8	1.6
7	309	304	-1.6	4294	4298	0.1	44.3	44.6	0.3
8	305	299	-2.0	4243	4126	-2.8	44.0	44.1	0.1
9	308	296	-3.9	4250	4230	-0.5	44.3	44.1	-0.2
10	303	304	0.3	4336	4258	-1.8	44.1	44.5	0.4
11	296	281	-5.1	4226	4308	1.9	43.9	43.8	-0.1
12	318	304	-4.4	4273	4307	0.0	44.3	44.7	0.4
13	312	310	-0.6	4374	4348	-0.6	44.3	44.8	0.5
14	310	302	-2.6	4334	4267	-1.5	44.1	44.7	0.6
15	313	304	-2.9	4262	4313	1.2	44.1	44.5	0.4
16	310	311	0.3	4338	4251	-2.0	44.4	44.3	-0.1
17	304	302	-0.7	4204	4225	0.5	43.7	44.7	1.0
18	317	314	-0.9	4263	4304	1.0	44.0	43.5	-0.5
19	305	299	-2.0	4264	4247	-0.4	43.9	44.3	0.4
20	311	291	-6.4	4219	4310	2.2	44.0	44.2	0.2
21	307	300	-2.3	4326	4417	2.1	44.1	44.5	0.4
22	307	291	-5.2	4223	4298	1.8	44.4	44.7	0.3
23	309	299	-3.2	4257	4294	0.9	44.2	45.0	0.8
24	312	313	0.3	4339	4320	-0.4	44.1	44.8	0.7
25	305	302	-1.0	4268	4291	0.5	44.0	43.9	-0.1
26	312	295	-5.4	4248	4321	1.7	43.7	44.8	1.1
27	300	292	-2.7	4281	4292	0.3	43.7	44.3	0.6
28	308	284	-7.8	4256	4212	-1.0	44.5	43.9	-0.6
29	303	290	-4.3	4252	4232	-0.5	43.7	44.5	0.8
30	311	291	-6.4	4313	4407	2.2	44.4	44.5	0.1
31	288	279	-3.1	4203	4232	0.7	43.8	44.1	0.3
32	301	282	-6.3	4247	4289	1.0	43.7	43.2	-0.5
33	303	295	-2.6	4256	4294	0.9	44.3	44.8	0.5
34	309	310	0.3	4357	4244	-2.6	43.6	44.7	1.1
35	311	314	1.0	4327	4199	-3.0	44.3	44.8	0.5

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
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Equipment: 1.Oven: E24-W520

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 Check.	
	(mA)	(mA)		(RPM)	(RPM)		(dB A)	(dB A)	
	400max.	400max.	15% Max	4300REF	4300REF	15% Max	45.6max.	45.6max.	3 dB Max
36	312	313	0.3	4321	4207	-2.6	44.1	44.7	0.6
37	298	286	-4.0	4314	4087	-5.3	43.8	44.2	0.4
38	304	288	-5.3	4299	4292	-0.2	43.9	44.2	0.3
39	304	296	-2.6	4275	4198	-1.8	44.0	44.5	0.5
40	315	305	-3.2	4296	4283	-0.3	44.4	44.3	-0.1
41	306	282	-7.8	4246	4300	1.3	43.3	44.7	1.4
42	304	298	-2.0	4337	4262	0.0	43.8	44.5	0.7
43	306	287	-6.2	4226	4330	0.0	43.9	44.7	0.8
44	312	304	-2.6	4280	4240	0.0	43.5	43.2	-0.3
45	304	301	-1.0	4296	4200	0.0	43.7	43.7	0.0
46	306	292	-4.6	4257	4298	0.0	43.7	44.1	0.4
47	312	295	-5.4	4252	4251	0.0	44.1	43.8	-0.3
48	310	302	-2.6	4297	4224	-1.7	44.8	44.5	-0.3
49	317	301	-5.0	4235	4305	1.7	43.5	43.7	0.2
50	305	289	-5.2	4244	4264	0.5	43.9	44.5	0.6
51	318	314	-1.3	4276	4247	-0.7	44.2	44.5	0.3
52	300	303	1.0	4290	4230	-1.4	43.6	44.3	0.7
53	296	292	-1.4	4306	4341	0.8	43.9	44.1	0.2
54	299	292	-2.3	4236	4252	0.4	43.6	44.5	0.9
55	312	295	-5.4	4251	4247	-0.1	44.2	44.7	0.5
56	313	291	-7.0	4231	4299	1.6	44.1	44.3	0.2
Mean (X-Bar)	306.5	297.3	-	4271.8	4270.4	-	44.0	44.3	-
Standard Deviation	6.586	9.114	-	44.127	56.995	-	0.314	0.405	-

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