



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 QFR120x120x38.0 mm series as the right table	QFR1224GHEA01				
	QFR1212HE-00EJ3				
	QFR1224EHE-BL52				
	QFR1224GHEYPR				

Representative Test P/N :QFR1224GHE-F00

Equipment:1. Oven: E24-F0036

◎ **L₁₀ Expectancy: 50,000 hours minimum @ fan rated voltage and the temperature of 40℃**

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 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)
60	40	4.00	56	2.303	4,968	10,360.0	729,833	104,262

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2006/9/11 2:00 PM	2008/8/22 7:45 AM	☐ In process	☐ In process (exceed requested)	☒ Termination	10360.0

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 (℃)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	11.31	2,064,280	294,897
30	8.00	1,459,666	208,524
40	4.00	729,833	104,262
50	2.00	364,917	52,131
55	1.41	258,035	36,862
60	1.00	182,458	26,065

Test Result

☒ **Accept**
☐ **Reject**

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG06FNL152-1	12089.50	2009/4/26	Nan.Yang	Zenny Lei



DC FAN FUNCTION TEST RECORD

FOR LIFE EXPERIMENT

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				QFR1212HE-00EJ3						
				QFR1224EHE-BL52						
				QFR1224GHEYPR						
Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)					
4,968	2006/9/11 2:00 PM	2008/8/22 7:45 AM	56	0	10360.0					
Representative Test P/N :QFR1224GHE-F00				Current Test Status		☐ In process		☐ In process (exceed requested)		☒ Termination
Equipment:1. Oven: E24-F0036										
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 Spec. (dB A)		
	1410	1410		5400-6600	5400-6600		68.0Max	68.0Max	3 dB Max	
1	868	937	7.9	6062	5740	-5.3	64.5	64.6	0.1	
2	863	919	6.5	6008	5755	-4.2	64.7	65.0	0.3	
3	906	979	8.1	6054	5754	-5.0	64.5	64.7	0.2	
4	871	941	8.0	6159	5764	-6.4	64.8	65.3	0.5	
5	890	908	2.0	6128	5745	-6.3	64.4	65.1	0.7	
6	841	906	7.7	6154	5753	-6.5	64.7	65.4	0.7	
7	947	901	-4.9	6051	5757	-4.9	64.6	64.8	0.2	
8	869	924	6.3	6099	5689	-6.7	64.8	64.7	-0.1	
9	865	933	7.9	5876	5759	-2.0	64.5	65.0	0.5	
10	867	928	7.0	6101	5734	-6.0	64.7	65.3	0.6	
11	892	964	8.1	5942	5729	-3.6	64.4	64.9	0.5	
12	871	900	3.3	5962	5758	-3.4	64.8	65.4	0.6	
13	863	909	5.3	5922	5753	-2.9	64.4	64.7	0.3	
14	955	918	-3.9	6116	5825	-4.8	64.7	65.0	0.3	
15	902	914	1.3	5929	5750	-3.0	64.5	64.8	0.3	
16	836	919	9.9	6065	5740	-5.4	64.8	65.1	0.3	
17	897	900	0.3	6027	5758	-4.5	64.5	64.6	0.1	
18	897	938	4.6	6166	5749	-6.8	64.9	64.9	0.0	
19	889	925	4.0	6072	5729	-5.6	64.6	65.2	0.6	
20	876	929	6.1	6159	5752	-6.6	64.7	64.7	0.0	
21	913	955	4.6	6026	5763	-4.4	64.4	64.6	0.2	
22	863	896	3.8	6100	5764	-5.5	64.8	65.1	0.3	
23	906	940	3.8	5976	5730	-4.1	64.5	64.9	0.4	
24	895	940	5.0	6006	5737	-4.5	64.9	65.2	0.3	
25	882	962	9.1	6120	5758	-5.9	64.4	64.8	0.4	
26	963	960	-0.3	5963	5771	-3.2	64.7	65.0	0.3	
27	885	900	1.7	5972	5758	-3.6	64.5	64.6	0.1	
28	926	933	0.8	5960	5752	-3.5	64.8	65.1	0.3	
29	887	965	8.8	5916	5768	-2.5	64.9	65.3	0.4	
30	883	969	9.7	6055	5752	-5.0	64.5	65.0	0.5	
31	945	976	3.3	6071	5728	-5.6	64.7	64.7	0.0	
32	897	969	8.0	5960	5738	-3.7	64.4	65.2	0.8	
33	930	973	4.6	6008	5764	-4.1	64.7	64.8	0.1	
34	923	965	4.6	6113	5768	-5.6	64.4	64.6	0.2	
35	907	932	2.8	6039	5744	-4.9	64.8	64.9	0.1	
QE File No.	Time-out for function test or others (hours)			Issued Date		Reported By		Approved By		
DG06FNL152-1	12089.50			2009/4/26		Nan.Yang		Zenny Lei		



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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Representative Test P/N :QFR1224GHE-F00			Current Test Status	☐ In process	☐ In process (exceed requested)	☒ Termination			
Equipment:1. Oven: E24-F0036									
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) 1410	Current Spec. (mA) 1410		Speed Spec. (RPM) 5400-6600	Speed Spec. (RPM) 5400-6600		Noise Spec. (dB A) 68.0Max	Noise Spec. (dB A) 68.0Max	
36	890	955	7.3	6051	5731	-5.3	64.5	65.1	0.6
37	859	909	5.8	6016	5762	-4.2	64.7	64.7	0.0
38	849	921	8.5	6031	5741	-4.8	64.5	64.9	0.4
39	914	926	1.3	6055	5725	-5.5	64.8	65.2	0.4
40	932	939	0.8	5942	5760	-3.1	64.7	65.0	0.3
41	866	923	6.6	6087	5752	-5.5	64.5	64.6	0.1
42	864	923	6.8	5975	5736	-4.0	64.7	64.4	-0.3
43	915	938	2.5	5954	5726	-3.8	64.7	64.5	-0.2
44	873	939	7.6	5960	5748	-3.6	64.4	64.7	0.3
45	942	964	2.3	6109	5756	-5.8	64.8	65.1	0.3
46	870	913	4.9	5921	5758	-2.8	64.5	64.8	0.3
47	879	944	7.4	5973	5753	-3.7	64.9	65.0	0.1
48	905	901	-0.4	6010	5752	-4.3	64.7	64.8	0.1
49	941	970	3.1	6111	5741	-6.1	64.8	65.3	0.5
50	858	929	8.3	6040	5749	-4.8	64.5	64.5	0.0
51	922	942	2.2	6051	5739	-5.2	64.8	64.7	-0.1
52	911	970	6.5	6060	5741	-5.3	64.4	65.1	0.7
53	889	945	6.3	5980	5733	-4.1	64.7	64.5	-0.2
54	846	927	9.6	6016	5727	-4.8	64.4	65.2	0.8
55	922	901	-2.3	6077	5824	-4.2	64.9	65.0	0.1
56	878	901	2.6	6100	5752	-5.7	64.5	64.8	0.3
X-Bar	892.8	934.1	-	6033.1	5749.9	-	64.63	64.91	-
σ	30.294	23.831	-	71.265	20.463	-	0.166	0.256	-
QE File No.	Time-out for function test or others (hrs)		Issued Date		Reported By		Approved By		
DG06FNL152-1	12089.50		2009/4/26		Nan.Yang		Zenny Lei		