

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	QFR1212GHE-SE1X	QFR1212EHE-SP02(BD26)	QFR1212GHEXWH	
	QFR1212GHE-F00	QFR1212GHE-DR27	QFR1212GHE-BF35	
	QFR1212EHE	QFR1212GHE-SP01	QFR1212GHEXUM	
	QFR1212GHE-9D89	QFR1212GHEXUZ		

Representative Test P/N :QFR1212DE-F00

Equipment: 1. Oven : E24-T0169 **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 ≐ 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 (°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 40 °C (hours)	Verified L ₁₀ 40 °C (hours)
60	40	4.00	56	2.303	4,968	15,360.0	1,082,069	154,581

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2006/5/8 4:00 PM	2008/1/23 12:15 AM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	15360.0

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	11.31	3,060,554	437,222
30	8.00	2,164,139	309,163
35	5.66	1,530,277	218,611
40	4.00	1,082,069	154,581
45	2.83	765,139	109,306
50	2.00	541,035	77,291
60	1.00	270,517	38,645

- Fan permission criteria for the measurement after test :
1. Speed can not drop of ≥ 15% below the original measured rpm.
 2. Current cannot increase > 15% of original measure current.
 3. 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
DG06FNL094-2	10016.00	2009/5/25	Nan.Yang	Zenny Lei



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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QFR1212EHE	QFR1212GHE-SP01	QFR1212GHEXUM	
QFR1212GHE-9D89	QFR1212GHEXUZ		

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
4,968	2006/5/8 4:00 PM	2008/1/23 12:15 AM	56	0	15360.0

Representative Test P/N :QFR1212DE-F00	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-T0169 On/Off Cycles: Every 500 hours

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. (A)	Current Spec. (A)		Speed Spec. (RPM)	Speed Spec. (RPM)		Noise Spec. (dB A)	Noise Spec. (dB A)	
	2.70Max.	2.70Max.		5520-6480	5520-6480		68.0Max	68.0Max	3 dBMax.
1	1.98	1.79	-9.5	5904	5757	-2.5	64.9	64.5	-0.4
2	2.01	1.83	-9.2	6034	5810	-3.7	64.7	64.3	-0.4
3	2.10	1.91	-9.0	5946	5788	-2.7	64.6	64.1	-0.5
4	2.02	1.85	-8.4	5870	5819	-0.9	65.0	64.6	-0.4
5	2.00	1.84	-8.2	5880	5688	-3.3	64.9	64.3	-0.6
6	1.98	1.88	-5.1	5830	5769	-1.0	64.8	64.6	-0.2
7	1.97	2.04	3.4	5842	6000	2.7	64.9	63.9	-1.0
8	2.09	2.06	-1.5	5990	5982	-0.1	64.9	64.7	-0.2
9	2.06	2.05	-0.3	6000	5974	-0.4	65.1	64.1	-1.0
10	2.04	1.84	-10.0	5944	5810	-2.3	64.9	64.3	-0.6
11	2.10	1.91	-9.0	5931	5833	-1.7	64.7	64.6	-0.1
12	2.17	2.01	-7.4	6007	5768	-4.0	65.2	63.9	-1.3
13	1.97	2.00	1.6	5886	5999	1.9	65.0	64.8	-0.2
14	1.97	2.02	2.4	5951	5981	0.5	64.8	64.3	-0.5
15	2.05	1.81	-11.7	5947	5801	-2.5	65.1	64.1	-1.0
16	1.97	2.03	3.0	5912	5980	1.2	64.9	64.7	-0.2
17	1.97	2.02	2.3	5911	5985	1.3	65.2	63.9	-1.3
18	2.03	2.06	1.5	5938	5968	0.5	65.0	64.6	-0.4
19	1.98	2.01	1.7	5958	6016	1.0	64.9	64.5	-0.4
20	1.97	2.01	2.2	5966	6044	1.3	65.1	64.3	-0.8
21	1.95	2.03	4.0	5901	5980	1.3	64.8	64.3	-0.5
22	1.99	1.82	-8.8	5966	5796	-2.8	64.8	64.5	-0.3
23	2.01	2.00	-0.7	5949	5991	0.7	65.1	64.5	-0.6
24	1.97	1.85	-6.3	5952	5763	-3.2	64.7	64.3	-0.4
25	2.01	2.06	2.3	5972	5989	0.3	65.0	64.9	-0.1
26	1.94	1.81	-6.5	5892	5738	-2.6	64.7	64.7	0.0
27	2.11	1.93	-8.5	5993	5792	-3.4	64.9	64.3	-0.6
28	1.98	1.80	-8.9	5883	5750	-2.3	65.0	65.0	0.0
29	2.02	2.02	0.1	5991	5969	-0.4	65.1	66.0	0.9
30	2.01	2.02	0.5	5965	5993	0.5	64.9	64.7	-0.2
31	2.04	2.04	0.0	5938	5993	0.9	65.0	64.2	-0.8
32	1.96	1.79	-8.9	5899	5755	-2.4	65.1	64.4	-0.7
33	1.97	2.02	2.6	5837	5963	2.2	64.9	64.6	-0.3
34	2.08	2.04	-2.1	5936	5994	1.0	64.9	65.1	0.2
35	1.93	1.83	-5.2	5940	5812	-2.2	65.2	64.4	-0.8

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	Current Spec. (A)	Current Spec. (A)		Speed Spec. (RPM)	Speed Spec. (RPM)		Noise Spec. (dB A)	Noise Spec. (dB A)	
	2.70Max.	2.70Max.		5520-6480	5520-6480		68.0Max	68.0Max	3 dBMax.
36	1.99	1.86	-6.5	5924	5756	-2.8	64.8	64.8	0.0
37	1.95	2.02	3.5	5874	5974	1.7	65.0	65.0	0.0
38	1.96	1.85	-5.6	5919	5797	-2.1	64.6	64.7	0.1
39	1.96	2.03	3.6	5890	5996	1.8	64.8	64.3	-0.5
40	1.99	2.03	2.0	5946	5964	0.3	64.9	64.4	-0.5
41	2.00	2.02	1.0	5946	6013	1.1	64.7	65.0	0.3
42	1.94	1.86	-4.1	5903	5814	-1.5	64.9	64.6	-0.3
43	2.00	1.81	-9.6	5940	5805	-2.3	65.1	64.7	-0.4
44	1.98	1.82	-8.2	5906	5776	-2.2	64.9	64.6	-0.3
45	1.95	1.82	-6.6	5896	5797	-1.7	64.6	64.5	-0.1
46	1.92	2.02	5.1	5929	5972	0.7	64.8	64.2	-0.6
47	2.03	1.82	-10.1	6070	5806	-4.3	64.9	65.0	0.1
48	1.92	1.82	-5.2	5922	5900	-0.4	64.6	65.1	0.5
49	1.97	1.80	-8.6	5930	5797	-2.2	64.9	64.5	-0.4
50	2.04	1.82	-10.7	6002	5798	-3.4	64.9	64.8	-0.1
51	2.04	1.89	-7.4	5997	5869	-2.1	65.2	65.0	-0.2
52	1.98	1.90	-4.0	5982	5926	-0.9	64.7	65.3	0.6
53	1.94	2.01	3.8	5932	6012	1.3	65.0	64.2	-0.8
54	1.87	1.80	-3.7	5933	5829	-1.8	64.8	64.6	-0.2
55	1.99	2.03	2.1	6033	5978	-0.9	64.9	65.1	0.2
56	2.04	2.01	-1.5	6027	5973	-0.9	65.1	65.0	-0.1
X-Bar	1.998	2.011	-	5938.6	5739.3	-	64.91	65.08	-
σ	0.054	0.107	-	50.223	131.034	-	0.161	0.410	-

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