



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 TFA 40x40x28.0 mm series as the right table	TFA0412BN-CN				

Representative Test P/N : TFA0412BN-AJ2K	
Equipment: 1.Oven: E24-T0164	On/Off Cycles: Every 500 hours

◎ **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%).

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	10,478.0	1,476,292	210,899

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2011/3/5 3:00 PM	2012/1/27 5:46 AM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	10478.0

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	4,175,584	596,512
30	16.00	2,952,584	421,798
40	8.00	1,476,292	210,899
50	4.00	738,146	105,449
60	2.00	369,073	52,725
70	1.00	184,536	26,362

- 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
DG11FNL019	4385.00	2012/11/20	Chaoping.Duan	Susana.Chen



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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TFA0412BN-CN				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2011/3/5 3:00 PM	2012/1/27 5:46 AM	56	0	10478.0

Representative Test P/N : TFA0412BN-AJ2K	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-T0164 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
	500 Max.	500 Max.		14820-16380	14820-16380		54.8 Max	54.8 Max	
1	427	412	-3.5	15414	15555	0.9	50.2	50.9	0.7
2	437	456	4.3	15466	15547	0.5	49.5	51.7	2.2
3	418	434	3.8	15522	15843	2.1	49.8	51.4	1.6
4	433	433	0.0	15889	16110	1.4	50.1	51.1	1.0
5	435	421	-3.2	15553	15648	0.6	49.9	50.9	1.0
6	419	400	-4.5	15540	15924	2.5	50.1	50.8	0.7
7	427	414	-3.0	15446	15959	3.3	49.8	51.0	1.2
8	434	418	-3.7	15466	15957	3.2	50.2	51.4	1.2
9	410	436	6.3	15605	15818	1.4	50.4	51.5	1.1
10	404	410	1.5	15272	15480	1.4	49.6	51.3	1.7
11	427	411	-3.7	15099	15691	3.9	49.9	51.1	1.2
12	431	427	-0.9	15609	15862	1.6	49.7	50.9	1.2
13	438	425	-3.0	15426	16057	4.1	49.8	51.4	1.6
14	457	435	-4.8	15307	15991	4.5	50.1	51.2	1.1
15	469	446	-4.9	15554	16047	3.2	50.3	51.5	1.2
16	444	426	-4.1	15292	15841	3.6	49.8	50.9	1.1
17	464	415	-10.6	15469	15627	1.0	50.5	51.0	0.5
18	431	396	-8.1	15315	15390	0.5	50.1	51.5	1.4
19	384	416	8.3	15360	15462	0.7	49.8	51.3	1.5
20	405	383	-5.4	15374	15571	1.3	50.0	51.1	1.1
21	420	407	-3.1	15573	16084	3.3	49.8	51.4	1.6
22	432	427	-1.2	15476	15707	1.5	49.7	51.6	1.9
23	430	421	-2.1	15462	15929	3.0	49.9	51.2	1.3
24	448	443	-1.1	15324	15852	3.4	50.2	50.9	0.7
25	428	439	2.6	15640	15890	1.6	50.0	51.6	1.6
26	437	426	-2.5	15368	15880	3.3	49.8	51.3	1.5
27	445	443	-0.4	15621	15951	2.1	50.1	50.9	0.8
28	416	413	-0.7	15565	15986	2.7	49.8	51.0	1.2
29	428	416	-2.8	15530	16116	3.8	50.2	51.4	1.2
30	412	417	1.2	15348	15985	4.2	49.9	51.0	1.1
31	433	433	0.0	15570	15549	-0.1	50.1	50.9	0.8
32	405	404	-0.2	15580	15829	1.6	50.1	51.6	1.5
33	429	428	-0.2	15703	16042	2.2	49.8	51.4	1.6
34	424	428	0.9	15630	15537	-0.6	50.0	51.0	1.0
35	451	433	-4.0	15307	15808	3.3	50.2	51.6	1.4

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG11FNL019	4385.00	2012/11/20	Chaoping.Duan	Susana.Chen



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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
	500 Max.	500 Max.		14820-16380	14820-16380		54.8 Max	54.8 Max	
36	410	413	0.7	15535	15795	1.7	49.8	51.1	1.3
37	421	436	3.6	15735	15738	0.0	49.7	51.6	1.9
38	435	406	-6.7	15495	16141	4.2	50.1	51.6	1.5
39	429	427	-0.5	15780	16131	2.2	49.8	51.4	1.6
40	413	422	2.2	15560	15897	2.2	50.2	51.8	1.6
41	449	421	-6.2	15584	16074	3.1	49.8	51.6	1.8
42	412	425	3.2	15291	16057	5.0	50.1	51.3	1.2
43	427	409	-4.2	15398	15427	0.2	49.9	51.1	1.2
44	414	422	1.9	15657	15833	1.1	50.2	51.0	0.8
45	429	419	-2.3	15547	15949	2.6	49.8	51.7	1.9
46	429	437	1.9	15609	15893	1.8	50.1	51.3	1.2
47	414	406	-1.9	15517	15906	2.5	49.9	51.6	1.7
48	426	409	-4.0	15604	15897	1.9	50.2	51.0	0.8
49	418	426	1.9	15634	15768	0.9	50.1	51.5	1.4
50	431	435	0.9	15798	16025	1.4	49.8	50.9	1.1
51	448	432	-3.6	15269	15942	4.4	50.0	51.1	1.1
52	426	444	4.2	15821	15882	0.4	49.9	51.4	1.5
53	429	424	-1.2	15670	16117	2.9	50.1	51.2	1.1
54	421	413	-1.9	15409	15789	2.5	49.8	50.9	1.1
55	394	396	0.5	15436	15753	2.1	50.2	51.6	1.4
56	433	417	-3.7	15396	15886	3.2	49.9	51.1	1.2
X-Bar	427.5	422.0	-	15507.5	15846.9	-	49.98	51.26	-
σ	15.817	14.008	-	156.701	195.528	-	0.205	0.275	-

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