

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 TCA 175x175x69.0 mm series as the right table	TCA1748ATAYT			
	TCA1748ATXHD			

Representative Test P/N : TCA1748AT-AM49	
Equipment: 1.Oven: E24-F0119	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	10,360.0	1,459,666	208,524

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2011/6/24 9:00 AM	2012/8/22 1:46 AM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> 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.

Temperature for MTTF Estimation (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	22.63	4,128,560	589,794
30	16.00	2,919,333	417,048
40	8.00	1,459,666	208,524
50	4.00	729,833	104,262
60	2.00	364,917	52,131
70	1.00	182,458	26,065

- 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
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QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG11FNL075	6715.00	2013/6/10	Chaoping.Duan	Tim.Yi



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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TCA1748ATAYT				
TCA1748ATXHD				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2011/6/24 9:00 AM	2012/8/22 1:46 AM	56	0	10360.0

Representative Test P/N : TCA1748AT-AM49	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-F0119 On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) 1.92 Max.	Final Test Current Spec. (A) 1.92 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 3600-4400	Final Test Speed Spec. (RPM) 3600-4400	Deviation (%)	Initial Test Noise Spec. (dB A) 72.0 Typ	Final Test Noise Spec. (dB A) 72.0 Typ	Deviation
1	1.58	1.44	-8.7	3928	3968	1.0	73.2	72.9	-0.3
2	1.64	1.44	-12.2	3975	3695	-7.0	73.1	73.0	-0.1
3	1.58	1.50	-5.0	3933	3759	-4.4	73.0	72.1	-0.9
4	1.60	1.60	0.3	3908	3919	0.3	73.2	73.5	0.3
5	1.60	1.57	-2.1	3915	3948	0.8	73.1	72.7	-0.4
6	1.62	1.64	1.1	3944	3913	-0.8	73.0	72.8	-0.2
7	1.56	1.61	3.1	3929	3947	0.5	73.1	72.6	-0.5
8	1.61	1.60	-0.7	3926	3913	-0.3	73.0	73.2	0.2
9	1.55	1.40	-9.9	3916	3794	-3.1	73.2	72.9	-0.3
10	1.55	1.44	-7.0	3923	3776	-3.7	73.1	72.4	-0.7
11	1.61	1.54	-3.9	3938	3917	-0.5	73.0	73.2	0.2
12	1.64	1.61	-1.6	3968	3954	-0.4	73.1	72.5	-0.6
13	1.60	1.47	-8.4	3945	3946	0.0	73.0	72.8	-0.2
14	1.59	1.45	-9.0	3934	3805	-3.3	73.2	72.6	-0.6
15	1.61	1.42	-11.5	3946	3771	-4.4	73.2	73.0	-0.2
16	1.57	1.45	-8.1	3924	3775	-3.8	73.1	73.5	0.4
17	1.56	1.56	-0.3	3942	3962	0.5	73.2	73.1	-0.1
18	1.56	1.53	-2.0	3913	3952	1.0	73.1	73.3	0.2
19	1.59	1.74	9.8	3937	3953	0.4	73.0	72.9	-0.1
20	1.59	1.60	0.8	3952	3949	-0.1	73.1	72.6	-0.5
21	1.62	1.45	-10.4	3950	3961	0.3	73.0	72.7	-0.3
22	1.60	1.59	-0.9	3931	3929	-0.1	73.1	73.1	0.0
23	1.63	1.49	-8.6	3963	3956	-0.2	73.0	73.5	0.5
24	1.60	1.51	-5.7	3930	3905	-0.6	73.2	73.0	-0.2
25	1.59	1.62	1.6	3925	3930	0.1	73.1	72.8	-0.3
26	1.61	1.51	-6.5	3959	3947	-0.3	73.0	72.6	-0.4
27	1.58	1.68	6.3	3929	3975	1.2	73.1	73.1	0.0
28	1.61	1.64	2.2	3928	3929	0.0	73.0	72.5	-0.5
29	1.61	1.65	2.6	3954	3947	-0.2	73.1	73.3	0.2
30	1.54	1.40	-9.1	3913	3928	0.4	73.0	73.0	0.0
31	1.56	1.47	-5.7	3958	3789	-4.3	73.1	73.5	0.4
32	1.63	1.65	1.0	3942	3914	-0.7	73.2	72.8	-0.4

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG11FNL075	6715.00	2013/6/10	Chaoping.Duan	Tim.Yi



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3,478	2011/6/24 9:00 AM	2012/8/22 1:46 AM	56	0	10360.0

Representative Test P/N : TCA1748AT-AM49	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-F0119 On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) 1.92 Max.	Final Test Current Spec. (A) 1.92 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 3600-4400	Final Test Speed Spec. (RPM) 3600-4400	Deviation (%)	Initial Test Noise Spec. (dB A) 72.0 Typ	Final Test Noise Spec. (dB A) 72.0 Typ	Deviation
33	1.56	1.63	4.5	3909	3960	1.3	73.0	73.7	0.7
34	1.59	1.55	-2.8	3955	3921	-0.9	73.2	72.9	-0.3
35	1.53	1.45	-5.1	3903	3939	0.9	73.1	72.9	-0.2
36	1.59	1.52	-4.5	3946	3961	0.4	73.3	73.1	-0.2
37	1.54	1.42	-8.0	3915	3949	0.9	73.2	72.6	-0.6
38	1.57	1.50	-4.5	3956	3941	-0.4	73.1	72.8	-0.3
39	1.60	1.62	0.9	3937	3965	0.7	73.0	73.2	0.2
40	1.63	1.60	-1.3	3933	3921	-0.3	73.0	73.5	0.5
41	1.64	1.54	-5.7	3920	3956	0.9	73.1	73.0	-0.1
42	1.62	1.46	-9.5	3959	3966	0.2	73.2	73.5	0.3
43	1.55	1.52	-2.2	3911	3942	0.8	73.1	73.1	0.0
44	1.63	1.65	1.7	3948	3923	-0.6	73.2	73.7	0.5
45	1.57	1.55	-1.3	3922	3922	0.0	73.1	73.5	0.4
46	1.62	1.40	-13.7	3964	3909	-1.4	73.0	73.2	0.2
47	1.53	1.42	-6.8	3927	3784	-3.6	73.1	72.9	-0.2
48	1.51	1.61	6.1	3944	3905	-1.0	73.0	72.5	-0.5
49	1.58	1.44	-9.1	3936	3958	0.6	73.2	73.1	-0.1
50	1.56	1.60	2.9	3920	3922	0.1	73.1	73.3	0.2
51	1.60	1.54	-4.1	3950	3944	-0.2	73.4	73.5	0.1
52	1.59	1.59	0.1	3961	3920	-1.0	73.6	73.0	-0.6
53	1.52	1.39	-8.3	3919	3779	-3.6	73.1	73.2	0.1
54	1.59	1.75	9.7	3938	3971	0.8	73.0	72.8	-0.2
55	1.55	1.64	5.8	3917	3912	-0.1	73.2	72.5	-0.7
56	1.62	1.52	-5.9	3934	3856	-2.0	73.1	73.7	0.6
X-Bar	1.587	1.538	-	3935.8	3908.1	-	73.11	73.01	-
σ	0.032	0.091	-	17.290	68.183	-	0.111	0.368	-

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DG11FNL075	6715.00	2013/6/10	Chaoping.Duan	Tim.Yi