



# 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 THC 120x120x38mm series as the right table

**Representative Test P/N: THC1248ME**  
**Equipment:** 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D

**Life Expectancy: L10 70,000 hours minimum @ fan rated voltage and the temperature of 40°C**

According to the equation for **Weibull distribution**,

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, **β= 3**

$$t = L10 \times (B_{r,c}/n)^{1/\beta} / [-\ln(0.9)]^{1/\beta} / AF, \text{ and } AF = 1.5^{(Ts-Tu)/10}$$

where, (B<sub>r,c</sub>) 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 <sub>F</sub>	Quantity of Test Devices n (pcs)	Poisson Distribution Factor B <sub>r,c</sub>	Required test time with zero failure t (hours)	Actual test time with zero failure t (hours)	Verified MTTF 40°C (hours)	Verified L10 40°C (hours)
70	40	3.38	56	2.303	15,158	7,302	63,756	33,721

**Test Progress:**

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
11-Feb-14	23-Feb-16	<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination	7,302

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 <sub>F</sub>	Estimated MTTF (hours)	Estimated L10 (hours)
25	6.20	117,127	61,950
30	5.06	95,634	50,582
40	3.38	63,756	33,721
50	2.25	42,504	22,481
60	1.50	28,336	14,987
70	1.00	18,891	9,992

Fan acceptance criteria for the measurements after test :

1. Speed cannot decrease ≥ 15% below the original measured RPM.
2. Current cannot increase > 15% over original measured current.
3. Noise cannot increase >3dB over the original measured noise.

Test Method according to IPC-9591.

**Test Result**  
 **Accept**  
 **Reject**

QE File No.	Time-out for function test or others (hours)	Date of issue	Reported By	Approved By
TH14FNL002	2,010	06-Mar-15	Natthichakorn	Niranam



## DC FAN FUNCTION TEST RECORD FOR CUSTOMIZED LIFE EXPERIMENT

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<b>Required Test Time (hrs)</b>	<b>Date for Test Beginning</b>	<b>Date for Test Termination</b>	<b>Sample Size (pcs):</b>	<b>Failure (pcs):</b>	<b>Current Total Test Time (hrs)</b>
<b>15,158</b>	<b>11-Feb-14</b>	<b>23-Feb-16</b>	<b>56</b>	<b>0</b>	<b>7,302</b>
Representative Test P/N: THC1248ME			<b>Current Test Status</b>	<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process exceed requested) <input type="checkbox"/> Termination
Equipment: 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D					

### Test Data Between Initial Test and Final Test

Sample No.	Initial Test	Final Test	Deviation (%) +15% Max	Initial Test	Final Test	Deviation (%) -15% Max	Initial Test	Final Test	Deviation dB +3 dB Max
	Current Spec. TYP (A) <b>0.8</b>	Current Spec. TYP (A) <b>0.8</b>		Speed Spec. REF (RPM) <b>7750</b>	Speed Spec. REF (RPM) <b>7750</b>		Noise at 1 m Max (dB A) <b>72</b>	Noise at 1 m Max (dB A) <b>72</b>	
1	0.76	0.82	7.4	7553	7735	2.4	67.4	68.5	1.1
2	0.80	0.79	-2.3	7851	7830	-0.3	68.1	68.7	0.6
3	0.78	0.85	8.4	7709	7812	1.3	67.6	68.5	0.9
4	0.83	0.82	-1.6	7793	7797	0.1	67.9	67.9	0.0
5	0.84	0.82	-2.7	7843	7832	-0.1	68.6	67.6	-1.0
6	0.82	0.78	-4.7	7802	7837	0.4	67.7	68.5	0.8
7	0.79	0.79	-0.6	7784	7828	0.6	67.9	68.3	0.4
8	0.80	0.84	4.6	7781	7840	0.8	68.0	68.6	0.6
9	0.81	0.80	-1.2	7808	7878	0.9	68.3	68.5	0.2
10	0.84	0.80	-3.9	7835	7806	-0.4	68.4	68.2	-0.2
11	0.77	0.75	-2.1	7822	7822	0.0	67.9	68.5	0.6
12	0.77	0.81	4.9	7812	7832	0.3	68.6	67.6	-1.0
13	0.81	0.81	0.5	7722	7834	1.5	67.6	68.3	0.7
14	0.80	0.80	-0.7	7845	7889	0.6	68.2	67.5	-0.7
15	0.82	0.86	4.2	7802	7857	0.7	67.7	68.1	0.4
16	0.85	0.78	-8.1	7836	7815	-0.3	67.9	67.7	-0.2
17	0.81	0.79	-2.9	7739	7835	1.2	67.4	68.0	0.6
18	0.79	0.83	4.0	7796	7792	-0.1	67.6	68.2	0.6
19	0.77	0.79	3.1	7605	7856	3.3	67.3	68.5	1.2
20	0.86	0.82	-4.9	7784	7833	0.6	67.8	67.8	0.0
21	0.79	0.77	-1.7	7704	7813	1.4	67.5	68.0	0.5
22	0.80	0.81	1.0	7649	7836	2.4	67.4	68.4	1.0
23	0.78	0.80	3.8	7701	7800	1.3	67.7	68.3	0.6
24	0.83	0.79	-4.0	7679	7727	0.6	67.5	67.8	0.3
25	0.79	0.83	4.7	7791	7818	0.3	67.9	67.6	-0.3
26	0.84	0.78	-6.8	7747	7858	1.4	68.1	68.1	0.0
27	0.81	0.84	4.3	7818	7859	0.5	68.6	68.2	-0.4
28	0.81	0.85	5.5	7735	7748	0.2	67.7	68.6	0.9
29	0.79	0.81	3.2	7738	7809	0.9	67.5	67.6	0.1
30	0.80	0.83	3.8	7788	7860	0.9	68.2	68.4	0.2
31	0.77	0.81	5.6	7751	7843	1.2	68.0	69.1	1.1
32	0.79	0.80	1.1	7809	7842	0.4	68.5	68.1	-0.4
33	0.76	0.81	6.4	7761	7822	0.8	67.9	68.7	0.8
34	0.82	0.84	2.1	7777	7836	0.8	67.6	67.6	0.0
35	0.81	0.87	6.7	7766	7852	1.1	67.6	67.9	0.3

<b>QE File No.</b>	<b>Time-out for function test or others (hours)</b>	<b>Date of issue</b>	<b>Reported By</b>	<b>Approved By</b>
<b>TH14FNL002</b>	<b>2,010</b>	<b>6-Mar-15</b>	<b>Natthichakorn</b>	<b>Niranam</b>



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<b>15,158</b>	<b>11-Feb-14</b>	<b>23-Feb-16</b>	<b>56</b>	<b>0</b>	<b>7,302</b>
Representative Test P/N: THC1248ME			<b>Current Test Status</b>	<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested) <input type="checkbox"/> Termination
Equipment: 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D					

### 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 dB
	Current Spec. TYP (A)	Current Spec. TYP (A)		Speed Spec. REF (RPM)	Speed Spec. REF (RPM)		Noise at 1 m Max (dB A)	Noise at 1 m Max (dB A)	
	<b>0.8</b>	<b>0.8</b>	<b>+15% Max</b>	<b>7750</b>	<b>7750</b>	<b>-15% Max</b>	<b>72</b>	<b>72</b>	<b>+3 dB Max</b>
36	0.81	0.83	2.8	7742	7820	1.0	68.0	68.1	0.1
37	0.79	0.78	-1.0	7759	7811	0.7	68.3	68.4	0.1
38	0.80	0.83	3.5	7781	7866	1.1	67.9	67.7	-0.2
39	0.79	0.80	1.8	7790	7821	0.4	68.3	68.0	-0.3
40	0.81	0.81	0.1	7771	7812	0.5	67.7	68.5	0.8
41	0.80	0.83	3.7	7802	7827	0.3	68.4	69.1	0.7
42	0.80	0.79	-1.2	7816	7816	0.0	68.2	68.7	0.5
43	0.82	0.85	2.9	7817	7830	0.2	67.8	68.1	0.3
44	0.77	0.84	9.6	7713	7848	1.8	67.7	67.6	-0.1
45	0.79	0.86	9.3	7809	7864	0.7	67.5	67.8	0.3
46	0.79	0.86	8.7	7803	7851	0.6	68.3	68.2	-0.1
47	0.80	0.87	7.7	7795	7827	0.4	67.7	68.5	0.8
48	0.83	0.82	-1.5	7807	7848	0.5	67.9	67.9	0.0
49	0.78	0.85	9.7	7776	7840	0.8	67.7	67.7	0.0
50	0.83	0.87	5.5	7752	7842	1.2	67.4	68.3	0.9
51	0.80	0.87	8.8	7802	7825	0.3	68.6	68.6	0.0
52	0.80	0.84	4.6	7813	7853	0.5	68.2	68.1	-0.1
53	0.80	0.81	1.6	7748	7791	0.6	67.7	68.2	0.5
54	0.79	0.84	7.3	7641	7840	2.6	67.3	67.9	0.6
55	0.78	0.84	7.6	7658	7785	1.7	67.8	67.5	-0.3
56	0.78	0.83	6.0	7742	7879	1.8	67.6	68.2	0.6
X-bar	0.80	0.82	-	7766	7828	-	67.9	68.2	-
$\sigma$	0.02	0.03	-	61	31	-	0.4	0.4	-

<b>QE File No.</b>	<b>Time-out for function test or others (hours)</b>	<b>Date of issue</b>	<b>Reported By</b>	<b>Approved By</b>
<b>TH14FNL002</b>	<b>2,010</b>	<b>6-Mar-15</b>	<b>Natthichakorn</b>	<b>Niranam</b>