



# 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 <b>KFB 175x175x69.0 mm</b> series as the right table	KFB1748VHT-CN				
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<b>Representative Test P/N : KFB1748VHT-9B1C</b>	
<b>Equipment: 1.Oven: E24-F0053 2. DC Source: E11-FD672</b>	<b>On/Off Cycles: Every 500 hours</b>

◎ **L<sub>10</sub> Expectancy: 80,000 hours minimum @ fan rated voltage and the temperature of 40°C**  
 According to the equation for **Weibull distribution**,  $MTTF \cong 7 \times L_{10} = 560,000$  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,

$$t = 1.036 \times MTTF \times [(B_{r;c}) \div n]^{0.91} \div A_F, \text{ and } A_F = 2^{(T_s - T_u)/10}$$

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 T <sub>s</sub> (°C) (Actual Test Temperature)	Unstress Temperature T <sub>u</sub> (°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 L <sub>10</sub> 40 °C (hours)
70	40	8.00	56	2.303	3,975	11,975.0	1,687,211	241,030

**Test Progress:**

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2010/1/12 10:30 AM	2011/1/20 3:36 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	11975.0

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' L<sub>10</sub> 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 L <sub>10</sub> (hours)
25	22.63	4,772,153	681,736
30	16.00	3,374,422	482,060
40	8.00	1,687,211	241,030
50	4.00	843,605	120,515
60	2.00	421,803	60,258
70	1.00	210,901	30,129

- 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  $> 3\text{dB}$  over the original measure noise.

<b>Test Result</b>	<input checked="" type="checkbox"/> <b>Accept</b>
	<input type="checkbox"/> <b>Reject</b>

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG09FNL181	4982.50	2011/12/24	Nan Yang	Tim Yi



# DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

Available for these models with lower speed and same physical structure.  
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KFB1748VHT-CN				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,975	2010/1/12 10:30 AM	2011/1/20 3:36 PM	56	0	<b>11975.0</b>

Representative Test P/N : KFB1748VHT-9B1C	<b>Current Test Status</b>	<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-F0053 2. DC Source: E11-FD672      On/Off Cycles: Every 500 hours

### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A)	Final Test Current Spec. (A)	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 3 dBMax.
	860 Max.	860 Max.		2790-3410	2790-3410		70.0 Max	70.0 Max	
1	710	657	-7.5	2846	2997	5.3	66.4	66.2	-0.2
2	711	690	-3.0	3073	3098	0.8	66.8	66.5	-0.3
3	703	709	0.9	3075	3122	1.5	67.0	66.1	-0.9
4	706	702	-0.6	3087	3117	1.0	66.9	66.4	-0.5
5	709	714	0.7	3082	3000	-2.7	66.4	66.3	-0.1
6	707	690	-2.4	3085	3093	0.3	66.7	66.0	-0.7
7	701	725	3.4	3036	3018	-0.6	66.3	66.0	-0.3
8	712	696	-2.2	3031	3118	2.9	66.7	66.3	-0.4
9	717	695	-3.1	3064	3118	1.8	66.4	66.5	0.1
10	703	723	2.8	3075	3250	5.7	66.8	66.1	-0.7
11	735	666	-9.4	3109	3054	-1.8	66.6	66.3	-0.3
12	726	683	-5.9	3106	3120	0.5	66.3	66.3	0.0
13	701	699	-0.3	3068	3102	1.1	66.5	66.2	-0.3
14	703	668	-5.0	3067	3094	0.9	66.7	66.5	-0.2
15	716	688	-3.9	3053	3086	1.1	67.0	66.3	-0.7
16	703	639	-9.1	3064	3029	-1.1	66.0	66.5	0.5
17	695	693	-0.3	3059	3071	0.4	66.3	66.2	-0.1
18	676	659	-2.5	3013	3040	0.9	66.7	66.5	-0.2
19	670	687	2.5	3021	3083	2.1	66.5	66.4	-0.1
20	702	662	-5.7	3068	3056	-0.4	66.7	66.2	-0.5
21	698	701	0.4	3072	3071	0.0	67.0	66.5	-0.5
22	698	688	-1.4	3074	3091	0.6	66.8	66.5	-0.3
23	713	675	-5.3	3068	3114	1.5	66.3	66.2	-0.1
24	705	680	-3.5	3073	3104	1.0	66.9	66.2	-0.7
25	711	693	-2.5	3071	3074	0.1	66.6	66.5	-0.1
26	710	677	-4.6	3065	3105	1.3	67.0	66.3	-0.7
27	700	649	-7.3	3077	3069	-0.3	66.5	66.5	0.0
28	681	673	-1.2	3038	3109	2.3	66.8	66.3	-0.5
29	682	672	-1.5	3038	3030	-0.3	66.5	66.5	0.0
30	700	659	-5.9	3070	3076	0.2	66.7	66.4	-0.3
31	705	671	-4.8	3073	3060	-0.4	66.3	66.3	0.0
32	698	647	-7.3	3067	3039	-0.9	66.9	66.5	-0.4
33	701	627	-10.6	3065	2994	-2.3	66.4	66.1	-0.3
34	681	649	-4.7	3026	3038	0.4	66.8	66.4	-0.4
35	670	705	5.2	3017	3194	5.9	66.3	66.3	0.0

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
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3,975	2010/1/12 10:30 AM	2011/1/20 3:36 PM	56	0	<b>11975.0</b>

Representative Test P/N : KFB1748VHT-9B1C	<b>Current Test Status</b>	<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-F0053 2. DC Source: E11-FD672	On/Off Cycles: Every 500 hours
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### Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec.	Final Test Current Spec.	Deviation (%)	Initial Test Speed Spec.	Final Test Speed Spec.	Deviation (%)	Initial Test Noise Spec.	Final Test Noise Spec.	Deviation
	( A ) <b>860 Max.</b>	( A ) <b>860 Max.</b>		( RPM ) <b>2790-3410</b>	( RPM ) <b>2790-3410</b>		( dB A ) <b>70.0 Max</b>	( dB A ) <b>70.0 Max</b>	
36	689	626	-9.1	3028	2998	-1.0	66.5	66.5	0.0
37	716	707	-1.3	3085	3091	0.2	66.7	66.2	-0.5
38	720	707	-1.8	3084	3135	1.7	66.4	66.5	0.1
39	699	690	-1.3	3001	3088	2.9	66.8	66.4	-0.4
40	701	705	0.6	3000	3067	2.2	66.6	66.3	-0.3
41	704	679	-3.6	3070	3085	0.5	66.3	66.2	-0.1
42	707	692	-2.1	3068	3093	0.8	66.5	66.4	-0.1
43	699	675	-3.4	3061	3080	0.6	67.0	66.5	-0.5
44	698	675	-3.3	3067	3107	1.3	66.7	66.4	-0.3
45	697	768	10.2	3064	3283	7.1	66.5	66.2	-0.3
46	706	650	-7.9	3056	3060	0.1	66.3	66.2	-0.1
47	700	704	0.6	3070	3114	1.4	66.7	66.5	-0.2
48	690	763	10.6	3026	3187	5.3	66.8	66.5	-0.3
49	707	669	-5.4	3027	3053	0.9	66.4	66.5	0.1
50	695	696	0.1	3028	3085	1.9	66.9	66.3	-0.6
51	708	708	0.0	3032	3049	0.6	66.6	66.5	-0.1
52	684	692	1.2	3035	3095	2.0	66.7	66.4	-0.3
53	714	677	-5.2	3039	3088	1.6	66.4	66.5	0.1
54	701	681	-2.9	3043	3056	0.4	66.9	66.3	-0.6
55	711	647	-9.0	3042	3009	-1.1	66.7	66.5	-0.2
56	693	668	-3.6	3041	3017	-0.8	66.5	66.2	-0.3
X-Bar	701.8	683.8	-	3052.6	3083.5	-	66.61	66.34	-
$\sigma$	12.433	27.619	-	37.207	55.082	-	0.236	0.146	-

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DG09FNL181	4982.50	2011/12/24	Nan Yang	Tim Yi