



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 KDB 30X30X10mm series as the right table					
Representative Test P/N :KDB0305HA3-00C1J (I:4023108100 ; F:4023106418)					
Equipment: 1.Oven: E24-W520					

© L₁₀ Expectancy: **30,000** hours minimum @ fan rated voltage and the temperature of 40℃

According to the equation for **Weibull distribution**, $MTTF \cong 7 \times L_{10} = 210,000$ 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_{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%), and

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	1,490	2,496.0	351,673	50,239

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2017/5/6 10:00 AM	2017/7/10 10:28 AM	☐ In process	☐ In process (exceed requested)	☒ Termination	2496.0

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	994,680	142,097
30	16.00	703,345	100,478
40	8.00	351,673	50,239
50	4.00	175,836	25,119
60	2.00	87,918	12,560
70	1.00	43,959	6,280

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.

Test Result

☒ Accept
☐ Reject

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
WJQEFML-2017089VD	70.00	2017/8/21 8:00 AM	KAI.GONG	TAOE.LIANG

BGN(dBA) : 18.0

Temp(°C) : 22.3

P(cmHg) : 76.4



DC FAN FUNCTION TEST RECORD

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Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination (at least)	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
1,490	2017/5/6 10:00 AM	2017/7/10 10:28 AM	56	0	2496.0

Representative Test P/N :KDB0305HA3-00C1J	Current Test Status	☐ In process	☐ In process (exceed requested)	☒ Termination
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Equipment: 1.Oven: E24-W520

Test Data Between Initial Test and Final Test(LARGE FAN)

Sample No.	Initial Test	Final Test	Deviation	Initial Test	Final Test	Deviation	Initial Test	Final Test	Deviation
	Current Spec. (mA)	Current Spec. (mA)		Speed Spec. (RPM)	Speed Spec. (RPM)		Noise Spec. (dB A)	Noise Check. (dB A)	
	500MAX.	500MAX.	15% MAX.	12500REF	12500REF	15% MAX.	46.0MAX.	46.0MAX.	3 dB MAX.
1	287	285	-0.7	11550	11077	-4.1	40.1	39.4	-0.7
2	273	275	0.7	11190	11772	5.2	40.7	39.8	-0.9
3	280	274	-2.1	11575	11571	0.0	39.1	40.0	0.9
4	288	284	-1.4	11605	12013	3.5	41.2	40.2	-1.0
5	272	277	1.8	11409	11855	3.9	40.3	39.8	-0.5
6	287	282	-1.7	11407	12166	6.7	39.8	40.0	0.2
7	279	282	1.1	11359	11675	2.8	39.9	40.5	0.6
8	268	283	5.6	11389	11652	2.3	39.1	39.4	0.3
9	287	285	-0.7	11303	11931	5.6	40.7	40.5	-0.2
10	279	274	-1.8	11598	12173	5.0	40.7	39.9	-0.8
11	287	289	0.7	11713	11537	-1.5	41.3	39.1	-2.2
12	267	272	1.9	11174	11582	3.7	40.2	39.5	-0.7
13	275	278	1.1	11550	12264	6.2	41.1	39.4	-1.7
14	275	277	0.7	11198	11644	4.0	40.4	40.0	-0.4
15	276	268	-2.9	11326	12068	6.6	39.7	40.2	0.5
16	280	275	-1.8	11459	12103	5.6	40.6	39.3	-1.3
17	284	282	-0.7	11519	11607	0.8	40.4	40.1	-0.3
18	274	282	2.9	11633	11831	1.7	40.1	39.7	-0.4
19	283	275	-2.8	11912	11665	-2.1	39.9	39.6	-0.3
20	284	285	0.4	11492	11982	4.3	40.1	40.1	0.0
21	289	273	-5.5	11831	12038	1.7	39.3	40.5	1.2
22	280	282	0.7	11869	11620	-2.1	41.3	39.3	-2.0
23	272	283	4.0	11254	11672	3.7	39.5	40.0	0.5
24	271	272	0.4	11366	11595	2.0	40.0	39.2	-0.8
25	278	276	-0.7	11431	12047	5.4	40.9	39.4	-1.5
26	269	275	2.2	11399	12006	5.3	40.2	39.7	-0.5
27	274	279	1.8	11147	11439	2.6	40.6	40.8	0.2
28	282	275	-2.5	11500	11884	3.3	40.2	39.6	-0.6
29	280	276	-1.4	11312	11768	4.0	40.3	39.8	-0.5
30	278	276	-0.7	11449	11835	3.4	41.2	40.1	-1.1



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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1,490	2017/5/6 10:00 AM	2017/7/10 10:28 AM	56	0	2496.0

Representative Test P/N :KDB0305HA3-00C1J

Current Test Status ☐ In process ☐ In process (exceed requested) ☒ Termination

Equipment: 1.Oven: E24-W520

Test Data Between Initial Test and Final Test(LARGE FAN)

Sample No.	Initial Test	Final Test	Deviation	Initial Test	Final Test	Deviation	Initial Test	Final Test	Deviation
	Current Spec. (mA)	Current Spec. (mA)		Speed Spec. (RPM)	Speed Spec. (RPM)		Noise Spec. (dB A)	Noise Check. (dB A)	
	500MAX.	500MAX.	15% MAX.	12500REF	12500REF	15% MAX.	46.0MAX.	46.0MAX.	3 dB MAX.
31	270	282	4.4	11118	11682	5.1	40.1	39.8	-0.3
32	281	273	-2.8	11371	11596	2.0	40.3	40.2	-0.1
33	282	281	-0.4	11312	11175	-1.2	39.8	39.7	-0.1
34	282	283	0.4	11482	11909	3.7	40.2	39.6	-0.6
35	282	280	-0.7	11366	11726	3.2	39.6	39.4	-0.2
36	285	268	-6.0	11516	11852	2.9	40.2	39.9	-0.3
37	286	279	-2.4	11595	11946	3.0	39.5	39.8	0.3
38	272	280	2.9	11294	11863	5.0	39.6	39.8	0.2
39	290	272	-6.2	11596	12204	5.2	39.9	39.5	-0.4
40	285	273	-4.2	11591	12025	3.7	39.7	40.1	0.4
41	270	272	0.7	12023	11667	-3.0	40.7	39.8	-0.9
42	287	284	-1.0	11806	11627	-1.5	40.3	40.1	-0.2
43	277	280	1.1	11445	11688	2.1	41.4	40.0	-1.4
44	285	268	-6.0	11475	11751	2.4	41.5	40.2	-1.3
45	279	285	2.2	11529	11998	4.1	41.5	39.5	-2.0
46	289	277	-4.2	11700	12004	2.6	41.1	39.4	-1.7
47	277	283	2.2	11302	12001	6.2	41.9	39.5	-2.4
48	282	273	-3.2	11514	11867	3.1	40.0	39.8	-0.2
49	291	290	-0.3	11938	12096	1.3	39.7	40.5	0.8
50	265	269	1.5	11123	11836	6.4	40.8	40.2	-0.6
51	274	278	1.5	11342	12123	6.9	39.9	40.3	0.4
52	290	280	-3.4	11726	12297	4.9	40.3	39.9	-0.4
53	272	278	2.2	11251	11994	6.6	40.6	39.1	-1.5
54	288	280	-2.8	11038	11639	5.4	40.0	39.9	-0.1
55	272	271	-0.4	11412	11855	3.9	40.1	40.5	0.4
56	277	285	2.9	11302	11744	3.9	40.7	39.5	-1.2
X-Bar	279.43	278.13	-	11465.82	11825.66	-	40.33	39.84	-
σ	6.785	5.350	-	216.716	245.649	-	0.634	0.393	-

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
WJQEFML-2017089VD	70.00	2017/8/21 8:00 AM	KAL.GONG	TAOE.LIANG