



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 BUB 75x73x20.0 mm series as the right table	BUB0712HD-SMH54				
Representative Test P/N : BUB0712HD-DA99		F:4020303718 I:4020303718		Date Code: 3906F65R	
Equipment: 1.Oven: E24-F0030			On/Off Cycles: Every 500 hours		

◎ **L₁₀ Expectancy: 30,000 hours minimum @ fan rated voltage and the temperature of 40°C**
 According to the equation for **Weibull distribution**, $MTTF \cong 7 \times L_{10} = 210,000$ 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%).

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	3,360.0	473,405	67,629

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2013/10/5 8:00 AM	2014/1/31 10:28 AM	<input type="checkbox"/> In process	<input checked="" type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination	3360.0

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	1,338,992	191,285
30	16.00	946,811	135,259
40	8.00	473,405	67,629
50	4.00	236,703	33,815
60	2.00	118,351	16,907
70	1.00	59,176	8,454

- 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	<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
DG13FNL136	1344.00	2014/4/21	NaNa.Wang	Tim.Yi

BGN (dBA) : 16.2

Temp (°C) : 24.0



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Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)				
1,490	2013/10/5 8:00 AM	2014/1/31 10:28 AM	56	0	3360.0				
Representative Test P/N : BUB0712HD-DA99			Current Test Status	<input type="checkbox"/> In process	<input checked="" type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination			
Equipment: 1.Oven: E24-F0030				On/Off Cycles: Every 500 hours					
Test Data Between Initial Test and Final Test									
Sample No.	Initial Test Current Spec. (A) 0.40 Max.	Final Test Current Spec. (A) 0.40 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 3600-4400	Final Test Speed Spec. (RPM) 3600-4400	Deviation (%)	Initial Test Noise Spec. (dB A) 45.5 Max	Final Test Noise Spec. (dB A) 45.5 Max	Deviation 3 dBMax.
1	0.263	0.264	0.4	4070	4132	1.5	43.3	42.3	-1.0
2	0.277	0.277	0.0	3997	3992	-0.1	42.3	42.1	-0.2
3	0.271	0.278	2.6	4106	3931	-4.3	42.8	42.3	-0.5
4	0.267	0.274	2.6	4073	3979	-2.3	42.7	42.1	-0.6
5	0.269	0.267	-0.7	4098	4046	-1.3	42.8	42.4	-0.4
6	0.281	0.277	-1.4	3990	3988	-0.1	43.1	42.2	-0.9
7	0.279	0.270	-3.2	3988	3962	-0.7	42.5	41.9	-0.6
8	0.279	0.275	-1.4	3963	4070	2.7	43.3	42.8	-0.5
9	0.275	0.271	-1.5	3978	3942	-0.9	42.4	42.2	-0.2
10	0.275	0.269	-2.2	3973	3952	-0.5	42.6	42.5	-0.1
11	0.282	0.282	0.0	3953	4089	3.4	42.8	42.7	-0.1
12	0.266	0.261	-1.9	4002	4023	0.5	43.0	41.9	-1.1
13	0.271	0.267	-1.5	4012	3921	-2.3	43.3	42.1	-1.2
14	0.272	0.267	-1.8	4010	3966	-1.1	42.4	42.3	-0.1
15	0.271	0.265	-2.2	4017	3991	-0.6	42.6	42.5	-0.1
16	0.270	0.272	0.7	4051	3925	-3.1	42.8	42.7	-0.1
17	0.269	0.266	-1.1	4029	3946	-2.1	43.0	41.9	-1.1
18	0.277	0.272	-1.8	3942	3970	0.7	43.2	42.2	-1.0
19	0.266	0.278	4.5	4013	3939	-1.8	42.3	42.0	-0.3
20	0.283	0.272	-3.9	3951	4001	1.3	42.5	42.4	-0.1
21	0.279	0.269	-3.6	3998	4140	3.6	42.7	42.6	-0.1
22	0.278	0.275	-1.1	3944	3954	0.3	42.9	42.8	-0.1
23	0.280	0.273	-2.5	3736	3943	5.5	43.1	42.0	-1.1
24	0.276	0.274	-0.7	3949	3873	-1.9	43.3	42.3	-1.0
25	0.280	0.265	-5.4	3977	3913	-1.6	42.4	42.5	0.1
26	0.280	0.272	-2.9	3917	3899	-0.5	42.6	42.7	0.1
27	0.272	0.266	-2.2	4060	4175	2.8	42.8	42.2	-0.6
28	0.281	0.266	-5.3	3934	3988	1.4	43.0	42.4	-0.6
29	0.280	0.268	-4.3	4061	3979	-2.0	42.4	42.0	-0.4
30	0.281	0.278	-1.1	3979	3997	0.5	42.6	42.5	-0.1
31	0.276	0.274	-0.7	3973	3990	0.4	43.0	42.7	-0.3
32	0.283	0.272	-3.9	3946	3943	-0.1	42.7	42.6	-0.1
QE File No.	Time-out for function test or others (hours)		Issued Date	Reported By		Approved By			
DG13FNL136	1344.00		2014/4/21	NaNa.Wang		Tim.Yi			



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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Equipment: 1.Oven: E24-F0030				On/Off Cycles: Every 500 hours					
Test Data Between Initial Test and Final Test									
Sample No.	Initial Test Current Spec. (A) 0.40 Max.	Final Test Current Spec. (A) 0.40 Max.	Deviation (%)	Initial Test Speed Spec. (RPM) 3600-4400	Final Test Speed Spec. (RPM) 3600-4400	Deviation (%)	Initial Test Noise Spec. (dB A) 45.5 Max	Final Test Noise Spec. (dB A) 45.5 Max	Deviation 3 dBMax.
33	0.264	0.262	-0.8	4025	3952	-1.8	42.9	41.9	-1.0
34	0.280	0.277	-1.1	3979	4006	0.7	43.2	42.1	-1.1
35	0.275	0.271	-1.5	3957	3995	1.0	42.3	42.3	0.0
36	0.281	0.275	-2.1	3917	3944	0.7	42.5	42.0	-0.5
37	0.282	0.270	-4.3	3962	4018	1.4	42.0	42.4	0.4
38	0.280	0.268	-4.3	4008	4021	0.3	42.9	42.6	-0.3
39	0.277	0.271	-2.2	3997	3954	-1.1	43.1	42.8	-0.3
40	0.267	0.258	-3.4	3999	4181	4.6	43.3	42.0	-1.3
41	0.277	0.271	-2.2	3943	3994	1.3	42.4	42.2	-0.2
42	0.277	0.275	-0.7	3942	4029	2.2	42.6	42.4	-0.2
43	0.259	0.261	0.8	4024	3986	-0.9	42.8	42.6	-0.2
44	0.282	0.289	2.5	3995	3741	-6.4	43.0	42.8	-0.2
45	0.270	0.273	1.1	4021	3980	-1.0	43.2	42.1	-1.1
46	0.280	0.269	-3.9	3970	3992	0.6	42.3	42.3	0.0
47	0.275	0.271	-1.5	3992	3964	-0.7	42.5	42.5	0.0
48	0.267	0.260	-2.6	4102	4111	0.2	42.7	42.7	0.0
49	0.282	0.276	-2.1	3930	3963	0.8	42.9	41.9	-1.0
50	0.271	0.273	0.7	4040	4007	-0.8	43.1	42.1	-1.0
51	0.266	0.264	-0.8	4041	3989	-1.3	42.9	42.2	-0.7
52	0.278	0.267	-4.0	4010	3938	-1.8	42.7	42.4	-0.3
53	0.269	0.268	-0.4	4028	3978	-1.2	43.2	42.6	-0.6
54	0.263	0.252	-4.2	3900	3932	0.8	42.8	42.8	0.0
55	0.279	0.276	-1.1	3924	4103	4.6	43.5	42.1	-1.4
56	0.275	0.269	-2.2	3950	3888	-1.6	43.2	42.3	-0.9
X-Bar	0.275	0.270	-	3988.3	3986.2	-	42.81	42.34	-
σ	0.006	0.006	-	59.497	74.563	-	0.336	0.279	-
QE File No.	Time-out for function test or others (hrs)		Issued Date		Reported By		Approved By		
DG13FNL136	1344.00		2014/4/21		NaNa.Wang		Tim.Yi		