

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 GFB40x40x56.0 mm series as the right table	GFB0412EHS-8E26			
	GFB0412EHS-7M16			
	GFB0412EHS-CF00			
	GFB0412SHS-CF00			
Representative Test P/N :GFB0412GHS-CF00				
Equipment: 1.Oven: E24-T0168			On/Off Cycles: Every 500 hours	

◎ **L₁₀ Expectancy:** **50,000** hours minimum @ fan rated voltage and the temperature of 40 °C

According to the equation for **Weibull distribution**, **MTTF $\hat{=}$ 7×L₁₀ = 350,000** 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 Ts (°C) (Actual Test Temperature)	Unstress Temperature Tu (°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)
60	40	4.00	56	2.303	4,968	6,969.0	490,947	70,135

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2008/3/28 2:30 PM	2009/2/10 10:15 AM	☐ In process	☒ In process (exceed requested)	☐ Termination	6969.0

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.

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 >3dB over the original measure noise.

Temperature for MTTF Estimation (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	11.31	1,388,607	198,372
30	8.00	981,893	140,270
40	4.00	490,947	70,135
50	2.00	245,473	35,068
60	1.00	122,737	17,534

Test Result

☒ **Accept**
☐ **Reject**

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG08FNL034	2683.50	2009/5/22	Nan Yang	Zenny Lei



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GFB0412EHS-8E26
GFB0412EHS-7M16
GFB0412EHS-CF00
GFB0412SHS-CF00

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
4,968	2008/3/28 2:30 PM	2009/2/10 10:15 AM	56	0	6969.0
Representative Test P/N :GFB0412GHS-CF00		Current Test Status	☐ In process	☒ In process (exceed requested)	☐ Termination
Equipment: 1.Oven: E24-T0168				On/Off Cycles: Every 500 hours	

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 Check.	Deviation
	(A)	(A)		(RPM)	(RPM)		(dB A)	(dB A)	
	2.15 Max.	2.15 Max.		15390-18810 14490-17710	15390-18810 14490-17710		70.5Max	70.5Max	3 dBMax.
1	1.84	1.68	-8.7	16912 15763	16512 16250	-2.4 3.1	68.5	68.3	-0.2
2	1.75	1.58	-9.7	16591 15768	16095 16486	-3.0 4.6	68.7	68.1	-0.6
3	1.72	1.58	-8.1	16717 15871	16583 16214	-0.8 2.2	68.9	67.8	-1.1
4	1.69	1.58	-6.5	18229 15510	16558 16177	-9.2 4.3	68.6	68.2	-0.4
5	1.78	1.58	-11.2	17329 15514	16542 16173	-4.5 4.2	68.8	68.4	-0.4
6	1.77	1.63	-7.9	16793 16351	16685 16258	-0.6 -0.6	68.5	67.9	-0.6
7	1.73	1.58	-8.7	16455 16098	16541 16072	0.5 -0.2	68.9	68.3	-0.6
8	1.72	1.59	-7.6	16787 15616	16580 16126	-1.2 3.3	69.0	68.1	-0.9
9	1.74	1.59	-8.6	16754 15510	16556 16036	-1.2 3.4	68.7	68.3	-0.4
10	1.70	1.57	-7.6	16917 15580	16506 16360	-2.4 5.0	68.8	68.3	-0.5
11	1.74	1.58	-9.2	16733 15472	16552 16174	-1.1 4.5	69.1	67.9	-1.2
12	1.68	1.59	-5.4	16906 15831	16588 16049	-1.9 1.4	68.7	68.1	-0.6
13	1.64	1.59	-3.0	16283 15627	16487 16209	1.3 3.7	68.9	68.5	-0.4
14	1.83	1.69	-7.7	16449 16070	16614 16108	1.0 0.2	68.8	68.4	-0.4
15	1.78	1.65	-7.3	17437 15713	16605 16217	-4.8 3.2	70.1	68.2	-1.9
16	1.75	1.58	-9.7	16740 15943	16499 16273	-1.4 2.1	68.8	67.9	-0.9
17	1.63	1.58	-3.1	18620 16381	16869 16128	-9.4 -1.5	68.9	68.1	-0.8
18	1.76	1.65	-6.3	16506 16011	16517 16234	0.1 1.4	68.6	68.2	-0.4

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
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GFB0412EHS-8E26

GFB0412EHS-7M16

GFB0412EHS-CF00

GFB0412SHS-CF00

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
4,968	2008/3/28 2:30 PM	2009/2/10 10:15 AM	56	0	6969.0
Representative Test P/N :GFB0412GHS-CF00		Current Test Status		☐ In process	☒ In process (exceed requested) ☐ Termination

Equipment: 1.Oven: E24-T0168

On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample	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
No.	(A)	(A)	(%)	(RPM)	(RPM)	(%)	(dB A)	(dB A)	
	2.15 Max.	2.15 Max.		15390-18810	15390-18810		70.5Max	70.5Max	3 dBMax.
				14490-17710	14490-17710				
19	1.79	1.58	-11.7	17035	16541	-2.9	68.7	68.0	-0.7
				15796	16099	1.9			
20	1.80	1.68	-6.7	16706	16524	-1.1	68.5	67.8	-0.7
				16427	16175	-1.5			
21	1.75	1.59	-9.1	15930	16640	4.5	68.8	68.4	-0.4
				15930	16173	1.5			
22	1.79	1.68	-6.1	16243	16541	1.8	69.1	67.9	-1.2
				15794	16154	2.3			
23	1.79	1.63	-8.9	16343	16593	1.5	69.2	68.2	-1.0
				16338	16222	-0.7			
24	1.61	1.58	-1.9	17334	16540	-4.6	68.7	68.3	-0.4
				15724	16182	2.9			
25	1.68	1.59	-5.4	16544	16613	0.4	68.4	68.0	-0.4
				15498	16085	3.8			
26	1.72	1.58	-8.1	16879	16603	-1.6	68.5	67.8	-0.7
				15834	16142	1.9			
27	1.75	1.58	-9.7	16598	16665	0.4	68.7	68.1	-0.6
				16296	16189	-0.7			
28	1.68	1.57	-6.5	16832	16523	-1.8	68.9	68.5	-0.4
				15639	16184	3.5			
29	1.71	1.58	-7.6	16011	16504	3.1	68.7	68.1	-0.6
				15586	16181	3.8			
30	1.72	1.59	-7.6	16769	16686	-0.5	68.9	68.5	-0.4
				16017	16096	0.5			
31	1.82	1.72	-5.5	17446	16548	-5.1	68.7	68.2	-0.5
				15598	16150	3.5			
32	1.68	1.58	-6.0	17334	16574	-4.4	68.9	67.9	-1.0
				15671	16137	3.0			
33	1.77	1.58	-10.9	16424	16567	0.9	68.6	68.3	-0.3
				15503	16084	3.7			
34	1.79	1.59	-11.2	17220	16579	-3.7	69.0	67.4	-1.6
				15509	16072	3.6			
35	1.66	1.58	-4.8	16866	16643	-1.3	68.8	68.1	-0.7
				15668	16207	3.4			
36	1.74	1.58	-9.2	17073	16495	-3.4	68.7	68.3	-0.4
				15950	16114	1.0			
37	1.76	1.59	-9.7	16657	16657	0.0	68.5	67.9	-0.6
				15731	16149	2.7			

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG08FNL034	2683.50	2009/5/22	Nan Yang	Zenny Lei



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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)				
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Representative Test P/N :GFB0412GHS-CF00				Current Test Status	☐ In process	☒ In process (exceed requested)	☐ Termination		
Equipment: 1.Oven: E24-T0168				On/Off Cycles: Every 500 hours					
Test Data Between Initial Test and Final Test									
Sample	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
No.	(A)	(A)	(%)	(RPM)	(RPM)	(%)	(dB A)	(dB A)	
	2.15 Max.	2.15 Max.		15390-18810	15390-18810		70.5Max	70.5Max	3 dBMax.
				14490-17710	14490-17710				
38	1.76	1.62	-8.0	16519	16539	0.1	68.7	68.2	-0.5
				16062	16101	0.2			
39	1.81	1.63	-9.9	17486	16497	-5.7	68.5	67.9	-0.6
				15745	16145	2.5			
40	1.78	1.59	-10.7	16894	16536	-2.1	68.6	68.1	-0.5
				15512	15999	3.1			
41	1.81	1.62	-10.5	17059	16590	-2.7	69.0	68.3	-0.7
				16069	16222	1.0			
42	1.82	1.67	-8.2	17025	16468	-3.3	68.9	68.5	-0.4
				15810	16320	3.2			
43	1.77	1.58	-10.7	17424	16597	-4.7	68.1	68.2	0.1
				15691	16108	2.7			
44	1.79	1.63	-8.9	17529	16581	-5.4	68.7	68.5	-0.2
				15575	16228	4.2			
45	1.80	1.66	-7.8	17570	16570	-5.7	68.5	68.3	-0.2
				15571	16198	4.0			
46	1.86	1.68	-9.7	17637	16561	-6.1	68.5	68.1	-0.4
				15539	16125	3.8			
47	1.90	1.69	-11.1	17349	16513	-4.8	68.9	67.8	-1.1
				15612	16235	4.0			
48	1.87	1.63	-12.8	17272	16852	-2.4	68.7	68.1	-0.6
				15765	16025	1.6			
49	1.82	1.69	-7.1	17136	16553	-3.4	68.8	68.5	-0.3
				15933	16325	2.5			
50	1.94	1.78	-8.2	17332	16542	-4.6	68.6	68.2	-0.4
				15730	16302	3.6			
51	1.87	1.79	-4.3	17023	16619	-2.4	68.9	67.9	-1.0
				16227	16016	-1.3			
52	1.88	1.69	-10.1	17123	16509	-3.6	68.7	68.3	-0.4
				15641	16116	3.0			
53	1.86	1.72	-7.5	16693	16586	-0.6	68.8	68.1	-0.7
				15631	16119	3.1			
54	1.80	1.68	-6.7	17064	16494	-3.3	68.5	68.4	-0.1
				15689	16300	3.9			
55	1.78	1.69	-5.1	16837	16658	-1.1	68.7	68.0	-0.7
				15842	16123	1.8			
56	1.82	1.78	-2.2	17537	16896	-3.7	68.6	67.8	-0.8
				15572	16082	3.3			
X-Bar	1.768	1.628	-	16377.4	16370.7	-	68.76	68.14	-
σ	0.069	0.059	-	705.549	226.385	-	0.269	0.235	-
QE File No.	Time-out for function test or others (hours)		Issued Date		Reported By		Approved By		
DG08FNL034	2683.50		2009/5/22		Nan Yang		Zenny Lei		