



# 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 FFB 120x120x38 mm series as the right table	FFB1212EHE	FFB1212SHE	FFB1212VHE		
	FFB1248EHE	FFB1248SHE	FFB1248VHE		

**Representative Test P/N : FFB1212EHE FFB1248EHE**

**Instruments used:** 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D On/Off Cycles: Every 500 hours

© **L<sub>10</sub> Expectancy:** **70,000 hours minimum @ fan rated voltage and the temperature of 40°C**

According to the equation for **Weibull distribution**, **MTTF  $\cong$  7×L10 = 490,000 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<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%), and

Stress/Elevated Temperature T <sub>s</sub> (°C)	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 (hours)	Verified L <sub>10</sub> (hours)
60	40	4.00	19	2.303	18,600	11,635.0	306,510	43,787

### Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2000/8/15 4:00 PM	2003/4/18 4:11 AM	<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination	11635.0

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. Basically, MTBF is equal to MTTF, they use same formula to work out a life data.)

Temperature for MTTF Estimation (°C)	Acceleration Factor A <sub>F</sub>	Estimated MTTF (hours)	Estimated L <sub>10</sub> (hours)
25	11.31	866,942	123,849
30	8.00	613,020	87,574
40	4.00	306,510	43,787
50	2.00	153,255	21,894
60	1.00	76,628	10,947

Fan permission criteria for the measurement after test:

1. For current, the limit is less than spec.(max.).
2. For speed, the allowable decrease is less than 15%.
3. For noise, the limit is less than spec.(max.). + 3 dB

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
A234L	4812.00	2002/6/26 11:00 AM	Bonnie Cheng	Peter Sun



# DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

Available for these models with lower speed and same physical structure.  
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applies to FFB 120x120x38 mm series as the right table

FFB1212EHE	FFB1212SHE	FFB1212VHE		
FFB1248EHE	FFB1248SHE	FFB1248VHE		

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
18,600	2000/8/15 4:00 PM	2003/4/18 4:11 AM	19	0	11635.0

Representative Test P/N : FFB1212EHE FFB1248EHE	Current Test Status	<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination
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Instruments used: 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D On/Off Cycles: Every 500 hours

### Test Data Between Initial Test and Final Test

Sample P/N : FFB1212EHE

Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)
	Current Spec. (A) 3.00 Max.	Current Spec. (A) 3.00 Max.		Speed Spec. (RPM) 4000 Ref.	Speed Spec. (RPM) 4000-15%		Noise Spec. (dB A) 63.0 Max.	Noise Spec. (dB A) 66.0 Max.	
1	1.78	1.90	6.7	3947	3851	-2.4	56.4	58.2	3.2
2	1.79	1.88	5.0	3922	3897	-0.6	56.6	58.6	3.5
3	1.80	1.90	5.6	3909	3912	0.1	56.8	58.6	3.2
4	1.79	1.89	5.6	4000	3862	-3.5	57.5	58.4	1.6
5	1.81	1.94	7.2	3961	3911	-1.3	57.6	58.6	1.7
6	1.84	1.95	6.0	3922	3865	-1.5	56.9	58.4	2.6
7	1.82	1.91	4.9	3947	3845	-2.6	57.2	58.1	1.6
8	1.82	1.90	4.4	3934	3912	-0.6	57.0	58.6	2.8
9	1.82	1.90	4.4	3922	3923	0.0	57.3	58.4	1.9
10	1.82	1.92	5.5	3922	3865	-1.5	57.5	59.0	2.6
X-Bar	1.809	1.909	-	3938.600	3884.300	-	57.080	58.490	-
$\sigma$	0.019	0.022	-	26.692	29.443	-	0.408	0.251	-

Sample P/N : FFB1248EHE

Spec.	0.75 Max.	0.75 Max.	Deviation	4000 Ref.	4000-15%	Deviation	63.0 Max.	66.0 Max.	%
1	0.54	0.53	-1.9	4040	3952	-2.2	59.5	59.0	-0.8
2	0.53	0.54	1.9	4013	3956	-1.4	59.4	59.0	-0.7
3	0.53	0.55	3.8	4054	3964	-2.2	58.3	58.0	-0.5
4	0.53	0.54	1.9	4000	3801	-5.0	58.5	58.9	0.7
5	0.52	0.51	-1.9	3987	3562	-10.7	58.5	58.6	0.2
6	0.53	0.55	3.8	4054	3932	-3.0	59.1	59.2	0.2
7	0.53	0.56	5.7	4096	3878	-5.3	59.2	58.7	-0.8
8	0.55	0.56	1.8	4068	3912	-3.8	59.2	58.6	-1.0
9	0.53	0.54	1.9	3961	3923	-1.0	58.5	58.8	0.5
X-Bar	0.532	0.542	-	4030.333	3875.556	-	58.911	58.756	-
$\sigma$	0.008	0.016	-	43.084	127.859	-	0.457	0.347	-

QE File No.	Time-out for function test or others (hrs)	Issued Date	Reported By	Approved By
A234L	4812.00	2002/6/26 11:00 AM	Bonnie Chang	Robert Sun