

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 AFB120x120x38mm series as the right table	AFB1212VHE	AFB1212HHE	AFB1212HE	AFB1212ME	AFB1212LE
	AFB1224VHE	AFB1224HHE	AFB1224HE	AFB1224ME	AFB1224LE

Representative Test P/N : **AFB1212SHE**

Equipment:	On/Off Cycles: Every 500 hours
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L₁₀ Expectancy: 70,000 hours minimum @ fan rated voltage and the temperature of 40

According to the equation for **Weibull distribution**, **MTTF 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_{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 () (Actual Test Temperature)	Unstress Temperature Tu ()	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 (hours)	Verified L ₁₀ 40 (hours)
60	40	4.00	56	2.303	6,956	6,956.0	490,031	70,004

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2004/3/27 4:30 PM	2005/11/25 11:03 PM	☐ In process	☐ In process (exceed requested)	☒ Termination	6956.0

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

Temperature for MTTF Estimation ()	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	11.31	1,386,017	198,002
30	8.00	980,062	140,009
40	4.00	490,031	70,004
50	2.00	245,015	35,002
60	1.00	122,508	17,501

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

Test Result

☒ **Accept**
☐ **Reject**

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG04FNL067	7643.00	2005/11/25 11:30 PM	Guie.Lin	gx.xu

Note: The test sample equivalent to STD , Part number: AFB1212SHE .

DC FAN FUNCTION TEST RECORD

FOR LIFE EXPERIMENT

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AFB1212VHE	AFB1212HH	AFB1212HE	AFB1212ME	AFB1212LE
AFB1224VHE	AFB1224HH	AFB1224HE	AFB1224ME	AFB1224LE

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
6,956	2004/3/27 4:30 PM	2005/11/25 11:03 PM	56	0	6956.0

Representative Test P/N :AFB1212SHE	Current Test Status	☐ In process	☐ In process (exceed requested)	☒ Termination
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Equipment:	On/Off Cycles: Every 500 hours
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Test Data Between Initial Test and Final Test

Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)
	Current Spec. (A) 1.60Max.	Current Spec. (A) 1.60Max.		Speed Spec. (RPM) 3404-3996	Speed Spec. (RPM) 3404-3996		Noise Spec. (dB A) 56.0Max	Noise Spec. (dB A) 56.0Max	
	1.05	1.04	-1.0	3680	3651	-0.8	53.0	53.3	0.6
	0.98	1.00	2.0	3622	3620	-0.1	53.2	53.0	-0.4
	1.02	1.01	-1.0	3777	3651	-3.3	53.1	53.2	0.2
	1.07	1.02	-4.7	3784	3704	-2.1	53.3	53.0	-0.6
	1.00	1.00	0.0	3720	3776	1.5	53.0	53.1	0.2
	1.01	0.98	-3.0	3676	3691	0.4	53.0	53.3	0.6
	1.03	1.01	-1.9	3724	3683	-1.1	53.3	53.5	0.4
	0.99	1.02	3.0	3872	3759	-2.9	53.1	53.1	0.0
	1.00	0.99	-1.0	3643	3635	-0.2	53.2	53.3	0.2
	1.01	0.98	-3.0	3749	3637	-3.0	53.3	53.2	-0.2
	1.00	0.97	-3.0	3716	3666	-1.3	53.1	53.4	0.6
	1.01	1.08	6.9	3752	3659	-2.5	53.2	53.0	-0.4
	0.98	1.01	3.1	3751	3634	-3.1	53.2	53.2	0.0
	1.02	1.01	-1.0	3635	3613	-0.6	53.0	53.4	0.8
	1.00	1.00	0.0	3753	3649	-2.8	53.1	53.0	-0.2
	1.00	0.99	-1.0	3798	3644	-4.1	53.1	53.3	0.4
	0.99	0.99	0.0	3661	3620	-1.1	53.0	53.1	0.2
	0.99	1.08	9.1	3684	3758	2.0	53.3	53.2	-0.2
	1.03	1.00	-2.9	3662	3588	-2.0	53.2	53.3	0.2
	0.99	1.02	3.0	3748	3617	-3.5	53.2	53.1	-0.2
	0.98	1.00	2.0	3704	3624	-2.2	53.1	53.5	0.8
	1.01	0.99	-2.0	3715	3605	-3.0	53.3	53.4	0.2
	0.99	0.99	0.0	3641	3590	-1.4	53.0	53.2	0.4
	0.98	0.99	1.0	3735	3636	-2.7	53.3	53.4	0.2
	1.00	1.00	0.0	3694	3860	4.5	53.4	53.0	-0.7
	1.05	1.03	-1.9	3715	3708	-0.2	53.2	53.5	0.6
	0.97	0.99	2.1	3690	3578	-3.0	53.1	53.2	0.2
	1.03	1.03	0.0	3724	3690	-0.9	53.4	53.1	-0.6
	0.99	0.99	0.0	3766	3618	-3.9	53.2	53.5	0.6
	0.96	0.98	2.1	3705	3615	-2.4	53.2	53.1	-0.2
	1.05	1.04	-1.0	3692	3680	-0.3	53.3	53.3	0.0
	0.99	1.02	3.0	3709	3759	1.3	53.1	53.2	0.2
	0.99	1.01	2.0	3704	3582	-3.3	53.2	53.1	-0.2
	0.99	0.98	-1.0	3706	3583	-3.3	53.5	53.0	-0.9
	0.97	0.98	1.0	3667	3561	-2.9	53.5	53.2	-0.6

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG04FNL067	7643.00	2005/11/25 11:30 PM	Guie.Lin	gx.xu

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	AFB1224VHE	AFB1224HHE	AFB1224HE	AFB1224ME	AFB1224LE

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
6,956	2004/3/27 4:30 PM	2005/11/25 11:03 PM	56	0	6956.0
Representative Test P/N :AFB1212SHE			Current Test Status	☐ In process ☐ In process (exceed requested) ☒ Termination	

Equipment:	On/Off Cycles: Every 500 hours
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Test Data Between Initial Test and Final Test

Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)
	Current Spec. (A) 1.60Max.	Current Spec. (A) 1.60Max.		Speed Spec. (RPM) 3404-3996	Speed Spec. (RPM) 3404-3996		Noise Spec. (dB A) 56.0Max	Noise Spec. (dB A) 56.0Max	
	1.02	1.00	-2.0	3759	3614	-3.9	53.0	53.1	0.2
	0.99	1.04	5.1	3728	3676	-1.4	53.1	53.5	0.8
	1.01	0.98	-3.0	3810	3605	-5.4	53.0	53.4	0.8
	0.98	0.97	-1.0	3718	3629	-2.4	53.1	53.2	0.2
	1.00	1.00	0.0	3765	3543	-5.9	53.3	53.1	-0.4
	1.00	0.98	-2.0	3658	3602	-1.5	53.1	53.2	0.2
	1.03	1.03	0.0	3718	3631	-2.3	53.3	53.4	0.2
	0.99	1.00	1.0	3755	3586	-4.5	53.2	53.0	-0.4
	1.03	0.98	-4.9	3764	3653	-2.9	53.3	53.2	-0.2
	1.02	1.00	-2.0	3735	3611	-3.3	53.5	53.4	-0.2
	1.03	1.05	1.9	3754	3656	-2.6	53.3	53.2	-0.2
	1.01	0.98	-3.0	3742	3630	-3.0	53.4	53.1	-0.6
	0.97	0.97	0.0	3730	3568	-4.3	53.2	53.0	-0.4
	1.01	1.01	0.0	3721	3639	-2.2	53.1	53.1	0.0
	0.98	0.97	-1.0	3703	3555	-4.0	53.0	53.3	0.6
	1.00	1.01	1.0	3748	3649	-2.6	53.2	53.5	0.6
	1.02	0.98	-3.9	3733	3625	-2.9	53.4	53.2	-0.4
	1.00	1.01	1.0	3748	3640	-2.9	53.1	53.1	0.0
	1.01	1.02	1.0	3620	3634	0.4	53.3	53.4	0.2
	1.08	1.10	1.9	3813	3706	-2.8	53.8	53.2	-1.1
	1.04	1.02	-1.9	3739	3678	-1.6	53.4	53.3	-0.2
X-Bar	1.006	1.006	-	3722.2	3643.0	-	53.21	53.23	-
σ	0.025	0.028	-	49.443	58.750	-	0.161	0.156	-

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