



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 EFC80x80x15 mm series as the right table	EFC0812DB-5E07			
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Representative Test P/N :EFC0812DB-F00

Equipment: 1.Oven: E24-F0037 **On/Off Cycles: Every 500 hours**

☉ **L₁₀ Expectancy: 70,000 hours minimum @ fan rated voltage and the temperature of 40°C**

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 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)
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)
2004/8/25 8:00 PM	2005/7/28 1:33 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> 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.)

Temperature for MTTF Estimation (°C)	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	<input checked="" type="checkbox"/> Accept <input type="checkbox"/> Reject
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QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG04FNL241	1126.00	2005/7/28 2:00 PM	Guie.Lin	Gx.Xu



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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EFC0812DB-5E07				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
6,956	2004/8/25 8:00 PM	2005/7/28 1:33 PM	56	0	6956.0

Representative Test P/N :EFC0812DB-F00	Current Test Status	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination
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Equipment: 1.Oven: E24-F0037 On/Off Cycles: Every 500 hours

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) 0.40Max.	Current Spec. (A) 0.40Max.		Speed Spec. (RPM) 3496-4104	Speed Spec. (RPM) 3496-4104		Noise Spec. (dB A) 45.0Max	Noise Spec. (dB A) 45.0Max	
1	0.31	0.32	3.2	3945	3933	-0.3	42.1	42.3	0.5
2	0.33	0.33	0.0	3964	3893	-1.8	42.3	42.3	0.0
3	0.35	0.35	0.0	3958	3925	-0.8	42.2	41.9	-0.7
4	0.33	0.33	0.0	3850	3925	1.9	41.9	42.2	0.7
5	0.32	0.32	0.0	3961	3938	-0.6	42.5	41.7	-1.9
6	0.31	0.33	6.5	3945	3915	-0.8	42.3	41.5	-1.9
7	0.32	0.31	-3.1	3975	3931	-1.1	41.7	42.0	0.7
8	0.32	0.32	0.0	3947	3816	-3.3	42.0	41.8	-0.5
9	0.33	0.33	0.0	3894	3917	0.6	42.2	41.5	-1.7
10	0.30	0.31	3.3	3898	3889	-0.2	42.7	41.7	-2.3
11	0.32	0.32	0.0	3978	3841	-3.4	41.8	42.2	1.0
12	0.33	0.32	-3.0	3934	3898	-0.9	42.6	41.7	-2.1
13	0.34	0.35	2.9	3932	3947	0.4	42.4	42.0	-0.9
14	0.35	0.36	2.9	3972	3901	-1.8	41.9	42.4	1.2
15	0.33	0.33	0.0	3943	3947	0.1	41.7	42.7	2.4
16	0.32	0.32	0.0	3937	3827	-2.8	42.3	42.5	0.5
17	0.33	0.32	-3.0	3921	3924	0.1	42.5	42.7	0.5
18	0.33	0.33	0.0	3928	3970	1.1	41.7	42.8	2.6
19	0.33	0.33	0.0	3908	3920	0.3	42.0	42.5	1.2
20	0.35	0.35	0.0	3939	3898	-1.0	42.1	42.7	1.4
21	0.32	0.32	0.0	3882	3808	-1.9	42.0	41.9	-0.2
22	0.32	0.32	0.0	3932	3946	0.4	42.3	42.0	-0.7
23	0.35	0.35	0.0	3944	3933	-0.3	41.8	42.2	1.0
24	0.33	0.33	0.0	3925	3846	-2.0	42.2	42.0	-0.5
25	0.32	0.33	3.1	3920	3851	-1.8	42.5	42.0	-1.2
26	0.32	0.33	3.1	3924	3901	-0.6	42.1	42.3	0.5
27	0.33	0.33	0.0	3954	3933	-0.5	41.7	41.7	0.0
28	0.32	0.33	3.1	3860	3915	1.4	41.9	41.7	-0.5
29	0.32	0.31	-3.1	3955	3996	1.0	42.1	41.8	-0.7
30	0.31	0.31	0.0	3825	3831	0.2	42.3	42.0	-0.7
31	0.32	0.32	0.0	3896	3892	-0.1	42.5	41.5	-2.4
32	0.33	0.33	0.0	3966	3982	0.4	41.8	41.7	-0.2
33	0.31	0.30	-3.2	3965	3909	-1.4	42.0	41.6	-1.0
34	0.32	0.32	0.0	3984	3965	-0.5	42.2	41.4	-1.9
35	0.32	0.32	0.0	3921	3906	-0.4	42.7	41.7	-2.3

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG04FNL241	1126.00	2005/7/28 2:00 PM	Guie.Lin	Gx.Xu



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Representative Test P/N :EFC0812DB-F00			Current Test Status	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested) <input checked="" type="checkbox"/> Termination

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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)	Current Spec. (A)		Speed Spec. (RPM)	Speed Spec. (RPM)		Noise Spec. (dB A)	Noise Spec. (dB A)	
	0.40Max.	0.40Max.		3496-4104	3496-4104		45.0Max	45.0Max	
36	0.31	0.31	0.0	3946	3927	-0.5	42.5	42.0	-1.2
37	0.32	0.33	3.1	3975	3969	-0.2	41.6	42.1	1.2
38	0.32	0.32	0.0	3880	3915	0.9	41.9	41.7	-0.5
39	0.34	0.34	0.0	3980	3931	-1.2	42.3	42.0	-0.7
40	0.34	0.34	0.0	3935	3967	0.8	41.7	41.8	0.2
41	0.33	0.33	0.0	3984	3982	-0.1	42.3	41.5	-1.9
42	0.33	0.33	0.0	3948	3912	-0.9	42.5	41.7	-1.9
43	0.31	0.33	6.5	3970	3896	-1.9	41.9	41.5	-1.0
44	0.32	0.32	0.0	3905	3906	0.0	42.2	42.0	-0.5
45	0.33	0.33	0.0	3819	3972	4.0	41.9	42.2	0.7
46	0.33	0.33	0.0	3964	3975	0.3	42.4	41.7	-1.7
47	0.33	0.31	-6.1	3910	3875	-0.9	42.5	42.0	-1.2
48	0.32	0.32	0.0	3840	3792	-1.3	41.7	42.0	0.7
49	0.33	0.33	0.0	3931	3991	1.5	41.9	41.7	-0.5
50	0.30	0.33	10.0	3987	3975	-0.3	41.6	41.5	-0.2
51	0.33	0.33	0.0	3962	3976	0.4	41.8	41.5	-0.7
52	0.34	0.34	0.0	3981	3876	-2.6	42.4	41.7	-1.7
53	0.32	0.32	0.0	3941	3952	0.3	42.3	41.7	-1.4
54	0.33	0.33	0.0	3971	3988	0.4	41.9	41.8	-0.2
55	0.32	0.32	0.0	3957	3949	-0.2	42.2	42.0	-0.5
56	0.32	0.32	0.0	3909	3924	0.4	41.7	41.8	0.2
X-Bar	0.325	0.327	-	3933.7	3918.5	-	42.11	41.94	-
σ	0.011	0.011	-	40.738	49.259	-	0.304	0.348	-

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