DELTA ELECTRONICS, INC.

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 **AFB 60x60x13 mm** series as the right table	AFB0612VHC	AFB0612HHC	AFB0612HC	AFB0612MC	AFB0612LC
	AFB0624VHC	AFB0624HHC	AFB0624HC	AFB0624MC	AFB0624LC
	AFB0605HC	AFB0605MC	AFB0605LC		
Representative Test P/N : AFB0612VHC					
Instruments used: 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D			On/Off Cycles: Every 500 hours		

◎ **L_{10} Expectancy:** 70,000 ℃

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)**

$$t = 1.036 \times MTTF \times [(B_{r;c}) \div n]^{0.91} \div A_F \text{, and } A_F = 2^{(Ts-Tu)/10}$$

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%), and

Stress/Elevated Temperature Ts (℃)	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 (hours)	Verified L_{10} (hours)
80	40	16.00	28	2.303	3,267	6,600.0	989,761	141,394

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2001/4/17 8:00 AM	2001/8/31 11:27 AM	☐ In process	☐ In process (exceed requested)	☑ Termination	6600.0

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_{10} 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,

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.**)

Fan permission criteria for the measurement after test :
1. For current, the limit is less than spec.(max.).
2. For speed, the allowable descrease is less than 15%.
3. For noise, the limit is less than spec.(max.). + 3 dB

Temperature for MTTF Estimation (℃)	Acceleration Factor A_F	Estimated MTTF (hours)	Estimated L_{10} (hours)
25	45.25	2,799,468	399,924
30	32.00	1,979,523	282,789
40	16.00	989,761	141,394
50	8.00	494,881	70,697
60	4.00	247,440	35,349
70	2.00	123,720	17,674
80	1.00	61,860	8,837

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
01FNS025L	348.00	2002/1/31 8:00 PM	Bonnie Chang	Robert Sun

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DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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AFB0612VHC	AFB0612HHC	AFB0612HC	AFB0612MC	AFB0612LC
AFB0624VHC	AFB0624HHC	AFB0624HC	AFB0624MC	AFB0624LC
AFB0605HC	AFB0605MC	AFB0605LC		

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,267	2001/4/17 8:00 AM	2001/8/31 11:27 AM	28	0	**6600.0**

presentative Test P/N : AFB0612VHC

Current Test Status ☐ In process ☐ In process (exceed requested) ☑ Termination

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 : AFB0612VHC-F00

Sample No.	Initial Test Current Spec. (A) **0.36 Max.**	Final Test Current Spec. (A) **0.36 Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **5400 Ref.**	Final Test Speed Spec. (RPM) **5400-15%**	Deviation (%)	Initial Test Noise Spec. (dB A) **42.0 Max.**	Final Test Noise Spec. (dB A) **45.0 Max.**	Deviation (%)
1	0.27	0.27	0.0	5430	5738	5.7	38.3	39.3	2.6
2	0.27	0.27	0.0	5310	5780	8.9	38.1	39.5	3.7
3	0.28	0.27	-3.6	5357	5805	8.4	37.8	39.6	4.8
4	0.27	0.27	0.0	5405	5822	7.7	38.8	39.6	2.1
5	0.27	0.26	-3.7	5218	5780	10.8	37.2	39.4	5.9
6	0.28	0.27	-3.6	5063	5822	15.0	37.3	39.6	6.2
7	0.26	0.27	3.8	5479	5011	-8.5	37.2	36.4	-2.2
8	0.27	0.27	0.0	5455	5734	5.1	38.2	39.3	2.9
9	0.27	0.26	-3.7	5430	5657	4.2	37.6	39.0	3.7
10	0.27	0.27	0.0	5504	5801	5.4	38.4	39.6	3.1
11	0.27	0.26	-3.7	5405	5759	6.5	37.8	39.4	4.2
12	0.27	0.27	0.0	5357	5745	7.2	37.6	39.3	4.5
13	0.26	0.27	3.8	5504	5812	5.6	37.2	39.6	6.5
14	0.27	0.26	-3.7	5357	5719	6.8	38.4	39.2	2.1
15	0.26	0.27	3.8	5430	5827	7.3	37.7	39.6	5.0
16	0.28	0.27	-3.6	5173	5662	9.5	36.6	39.0	6.6
17	0.26	0.27	3.8	5381	5781	7.4	38.0	39.5	3.9
18	0.27	0.28	3.7	5479	5817	6.2	38.6	39.6	2.6
19	0.27	0.27	0.0	5310	5797	9.2	38.4	39.5	2.9
20	0.28	0.28	0.0	5263	5698	8.3	37.4	39.2	4.8
21	0.27	0.27	0.0	5240	5767	10.1	37.2	39.4	5.9
22	0.27	0.27	0.0	5287	5790	9.5	37.8	39.5	4.5
23	0.27	0.27	0.0	5381	5757	7.0	37.9	39.4	4.0
24	0.27	0.27	0.0	5240	5760	9.9	37.4	39.4	5.3
25	0.27	0.27	0.0	5333	5714	7.1	38.0	39.2	3.2
26	0.28	0.27	-3.6	5195	5759	10.9	37.1	39.4	6.2
27	0.27	0.26	-3.7	5310	5734	8.0	38.0	39.3	3.4
28	0.27	0.27	0.0	5333	5771	8.2	37.3	39.4	5.6
X-Bar	0.270	0.269	-	5344	5736	-	37.8	39.3	-
σ	0.006	0.005	-	107.888	149.175	-	0.530	0.593	-

QE File No.	Time-out for function test or others (hrs)	Issued Date	Reported By	Approved By
01FNS025L	**348.00**	**2002/1/31 8:00 PM**	Bonnie Chang	Robert Sun