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 ARxx or AFxx series suffixes. This test report applies to PFC**120x120x38 mm** series as the right table	PFB1224EHE	PFB1224GHE			
	PFB1224SHE	PFB1224UHE			
	PFB1224VHE				
	PFB1224HHE				
Representative Test P/N : PFC1224DE-F00					
Equipment: 1. Oven:E24-T0168					

◎ **L_{10} 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,

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

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%).

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	11,360.0	800,280	114,326

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2005/1/31 3:00 PM	2008/5/29 6:33 PM	☐ In process	☐ In process (exceed requested)	☑ Termination	11360.0

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, 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 (℃)	Acceleration Factor A_F	Estimated MTTF (hours)	Estimated L_{10} (hours)
25	11.31	2,263,535	323,362
30	8.00	1,600,561	228,652
40	4.00	800,280	114,326
50	2.00	400,140	57,163
60	1.00	200,070	28,581

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
DG05FNL014	22184.00	2008/11/29 7:00 AM	Nan Yang	Zenny Lei

DELTA ELECTRONICS, INC.

DC FAN FUNCTION TEST RECORD
FOR LIFE EXPERIMENT

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	PFB1224SHE	PFB1224UHE			
	PFB1224VHE				
	PFB1224HHE				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
6,956	2005/1/31 3:00 PM	2008/5/29 6:33 PM	56	0	**11360.0**

Representative Test P/N : PFC1224DE-F00	Current Test Status	☐ In process	☐ In process (exceed requested)	☑ Termination

Equipment: 1. Oven:E24-T0168

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) **2.40Max.**	Final Test Current Spec. (A) **2.40Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **5060-5940**	Final Test Speed Spec. (RPM) **5060-5940**	Deviation (%)	Initial Test Noise Spec. (dB A) **70.5Max**	Final Test Noise Spec. (dB A) **70.5Max**	Deviation (%)
1	1.92	1.88	-1.8	5501	5574	1.3	68.3	68.5	0.3
2	1.84	1.86	1.4	5646	5874	4.0	68.7	68.3	-0.6
3	1.90	1.78	-6.3	5545	5624	1.4	68.4	67.8	-0.9
4	2.16	1.99	-7.8	5657	5687	0.5	68.5	68.8	0.4
5	2.03	1.92	-5.2	5592	5624	0.6	68.3	68.0	-0.4
6	1.98	1.88	-5.1	5656	5900	4.3	68.6	68.0	-0.9
7	1.83	1.78	-2.9	5611	5592	-0.3	68.4	68.1	-0.4
8	2.06	1.95	-5.5	5560	5762	3.6	68.7	68.3	-0.6
9	1.87	1.96	4.6	5762	5630	-2.3	68.2	68.4	0.3
10	2.02	1.92	-5.1	5640	5637	-0.1	68.6	68.3	-0.4
11	1.96	1.92	-2.1	5646	5480	-2.9	68.3	68.5	0.3
12	1.83	1.93	5.6	5630	5654	0.4	68.5	68.2	-0.4
13	2.02	1.85	-8.3	5476	5536	1.1	68.8	68.3	-0.7
14	2.09	1.89	-9.7	5590	5619	0.5	68.2	68.6	0.6
15	1.99	1.86	-6.6	5580	5535	-0.8	68.8	68.5	-0.4
16	2.09	1.98	-5.3	5637	5527	-2.0	68.3	68.8	0.7
17	2.00	1.92	-4.1	5631	5464	-3.0	68.2	68.0	-0.3
18	1.90	1.93	1.8	5433	5410	-0.4	68.3	68.5	0.3
19	1.90	1.88	-0.8	5702	5658	-0.8	68.7	68.2	-0.7
20	1.95	1.85	-5.3	5626	5474	-2.7	68.2	68.6	0.6
21	1.95	1.92	-1.3	5547	5349	-3.6	68.3	68.6	0.4
22	2.00	1.98	-1.0	5597	5528	-1.2	68.7	68.9	0.3
23	1.94	1.90	-2.0	5542	5685	2.6	68.6	68.2	-0.6
24	1.90	1.92	1.0	5627	5425	-3.6	68.4	68.5	0.1
25	1.86	1.90	2.4	5701	5578	-2.2	68.6	68.8	0.3
26	1.97	1.95	-1.1	5611	5686	1.3	68.2	68.5	0.4
27	1.96	1.93	-1.5	5736	5598	-2.4	68.5	68.6	0.1
28	1.97	1.92	-2.7	5565	5663	1.8	68.3	68.4	0.1
29	1.94	1.85	-4.4	5503	5725	4.0	68.4	68.7	0.4
30	1.95	1.88	-3.7	5520	5625	1.9	68.5	68.6	0.1
31	1.90	1.92	0.9	5762	5625	-2.4	68.8	68.2	-0.9
32	1.82	1.83	0.4	5593	5512	-1.4	68.3	68.5	0.3
33	1.83	1.93	5.3	5518	5636	2.1	68.6	68.5	-0.1
34	1.90	1.92	1.1	5544	5628	1.5	68.7	68.4	-0.4
35	1.92	1.85	-3.4	5641	5548	-1.6	68.3	68.0	-0.4

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG05FNL014	**22184.00**	**2008/11/29 7:00 AM**	**Nan Yang**	**Zenny Lei**

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DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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	PFB1224SHE	PFB1224UHE			
	PFB1224VHE				
	PFB1224HHE				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
6,956	2005/1/31 3:00 PM	2008/5/29 6:33 PM	56	0	**11360.0**

Representative Test P/N : PFC1224DE-F00	**Current Test Status**	☐ In process	☐ In process (exceed requested)	☑ Termination

Equipment: 1. Oven:E24-T0168

Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A) **2.40Max.**	Final Test Current Spec. (A) **2.40Max.**	Deviation (%)	Initial Test Speed Spec. (RPM) **5060-5940**	Final Test Speed Spec. (RPM) **5060-5940**	Deviation (%)	Initial Test Noise Spec. (dB A) **70.5Max**	Final Test Noise Spec. (dB A) **70.5Max**	Deviation (%)
36	1.95	1.92	-1.5	5552	5362	-3.4	68.4	67.7	-1.0
37	1.92	1.95	1.5	5662	5501	-2.8	68.7	68.5	-0.4
38	1.99	1.92	-3.3	5670	5502	-3.0	68.5	67.3	-1.8
39	1.98	1.86	-6.0	5579	5501	-1.4	68.3	68.5	0.3
40	2.01	1.98	-1.3	5704	5704	0.0	68.4	67.9	-0.7
41	1.86	1.90	2.4	5578	5689	2.0	68.5	67.8	-1.0
42	1.79	1.88	5.3	5689	5595	-1.7	68.7	68.2	-0.7
43	1.87	1.93	3.0	5599	5596	-0.1	68.6	67.9	-1.0
44	1.95	1.92	-1.4	5639	5501	-2.4	68.7	68.3	-0.6
45	1.99	1.93	-3.1	5595	5704	1.9	68.2	67.5	-1.0
46	1.98	1.90	-3.8	5592	5596	0.1	68.4	68.5	0.1
47	2.09	1.96	-6.1	5596	5615	0.3	68.7	68.5	-0.3
48	2.07	1.99	-4.0	5645	5596	-0.9	68.5	68.2	-0.4
49	1.80	1.85	3.0	5615	5524	-1.6	68.8	68.5	-0.4
50	1.96	1.92	-2.2	5624	5506	-2.1	68.6	68.9	0.4
51	1.94	1.93	-0.5	5690	5569	-2.1	68.2	68.5	0.4
52	1.86	1.82	-1.9	5596	5598	0.0	68.4	68.9	0.7
53	1.77	1.81	2.0	5663	5476	-3.3	68.6	69.0	0.6
54	2.03	1.93	-4.8	5503	5684	3.3	68.7	68.5	-0.3
55	1.96	1.90	-3.0	5524	5478	-0.8	68.5	68.1	-0.6
56	1.94	1.79	-7.6	5684	5468	-3.8	68.3	68.2	-0.1
X-Bar	1.943	1.902	-	5609.4	5586.4	-	68.48	68.35	-
σ	0.083	0.051	-	69.580	107.950	-	0.189	0.350	-

QE File No.	Time-out for function test or others (hrs)	Issued Date	Reported By	Approved By
DG05FNL014	**22184.00**	**2008/11/29 7:00 AM**	**Nan Yang**	**Zenny Lei**