DELTA ELECTRONICS, INC.

EC FAN CUSTOMIZED
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 **EC FAN250x250x105mm** series as the right table					

Representative Test P/N : AFL25A2LU-00ASU

◎ L_{10} Expectancy: 60,000 hours minimum @ fan rated voltage and the temperature of 40℃

According to the equation for **Weibull distribution**, **MTTF ≒ 1.89×L10 = 113,400 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,

$$t = 1.119 \times MTTF \times [(B_{r;c}) \div n]^{0.33} \div A_F \text{ , and } A_F = 1.5^{(Ts-Tu)/10}$$

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	2.25	20	2.303	50,829	5,360.0	21,994	11,637

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2015/10/8 2:00 AM	2022/9/20 1:00 PM	☑ In process	☐ In process (exceed requested)	☐ Termination	**5360.0**

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	4.13	40,405	21,378
30	3.38	32,991	17,455
40	2.25	21,994	11,637
50	1.50	14,663	7,758
60	1.00	9,775	5,172

Fan permission criteria for the measurement after test :
1. Speed can not drop of ≧ 15% below the original measured rpm.
2. Current cannot increase > 15% of original measure current.
3. Noise cannot >3dB over the original measure noise.

Test Method according to IPC-9591.

Test Result ☑ **Accept** ☐ **Reject**

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG14FNL046	10118.00	2017/7/14	Percy Su	Tim Yi

DELTA ELECTRONICS, INC.

EC FAN FUNCTION TEST RECORD

FOR LIFE EXPERIMENT

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
50,829	2015/10/8 2:00 AM	2021/11/9 3:00 PM	20	0	**5360.0**

Representative Test P/N : AFL25A2LU-00ASU	**Current Test Status**	☑ In process	☐ In process (exceed requested)	☐ Termination

1~10#:shaft;11~15#:GuanHao bushing;16#~20#:YiShan bushing

Test Data Between Initial Test and Final Test

Sample	Initial Test	Final Test	Deviation	Initial Test	Final Test	Deviation	Initial Test	Final Test	Deviation
	Power Spec. Max_Load 230VAC/50/60HZ	Power Spec. Max_Load 230VAC/50/60HZ		Speed Spec. 230VAC/50/60HZ	Speed Spec. 230VAC/50/60HZ		Noise Spec. Free_Air 230VAC/50/60HZ	Noise Spec. Free_Air 230VAC/50/60HZ	
No.	(W)	(W)	(%)	(RPM)	(RPM)	(%)	(dB A)	(dB A)	**3 dBMax.**
	30 Max.	**30 Max.**		**1600+-10%**	**1600+-10%**	15%	**56 Max**	**56 Max**	
1	15.30	13.30	-13.1	1599	1587	-0.8	48.9	48.9	0.0
2	15.40	14.23	-7.6	1611	1591	-1.2	49.1	48.8	-0.3
3	16.10	14.64	-9.1	1601	1589	-0.7	48.5	49.1	0.6
4	15.80	14.47	-8.4	1602	1584	-1.1	48.7	49.1	0.4
5	14.70	13.76	-6.4	1595	1607	0.8	49.0	49.2	0.2
6	15.00	14.41	-3.9	1591	1601	0.6	48.6	48.7	0.1
7	15.50	14.23	-8.2	1603	1589	-0.9	49.2	48.7	-0.5
8	15.50	14.88	-4.0	1601	1587	-0.9	48.8	49.2	0.4
9	15.00	14.76	-1.6	1597	1593	-0.3	49.3	49.1	-0.2
10	15.40	14.47	-6.0	1594	1583	-0.7	49.5	48.9	-0.6
11	15.00	14.29	-4.7	1600	1594	-0.4	48.7	49.8	1.1
12	15.30	14.53	-5.0	1597	1595	-0.1	48.6	48.8	0.2
13	15.20	14.35	-5.6	1598	1594	-0.3	49.4	48.9	-0.5
14	15.20	13.88	-8.7	1599	1591	-0.5	48.5	48.7	0.2
15	15.00	13.76	-8.3	1604	1581	-1.4	48.7	49.3	0.6
16	15.40	14.47	-6.0	1601	1602	0.1	48.7	48.8	0.1
17	15.40	13.88	-9.9	1605	1520	-5.3	48.9	48.8	-0.1
18	15.50	14.12	-8.9	1605	1588	-1.1	49.1	48.5	-0.6
19	15.30	14.64	-4.3	1599	1607	0.5	48.8	49.0	0.2
20	15.40	14.29	-7.2	1604	1591	-0.8	49.4	48.8	-0.6
X-Bar	15.320	14.268	-	1600.3	1588.7	-	48.92	48.96	
σ	0.307	0.390	-	4.497	17.723	-	0.314	0.286	

QE File No.	Time-out for function test or others (hrs)	Issued Date	Reported By	Approved By
DG14FNL046	**10118.00**	**2017/7/14**	**Percy Su**	**Tim Yi**