



DC FAN LIFE EXPERIMENT REPORT

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|--|------------|-----------|-----------|-----------|--|
| 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 EFB 50x50x10 mm series as the right table | EFB0505HA | EFB0505MA | EFB0505LA | | |
| | EFB0512HHA | EFB0512HA | EFB0512MA | EFB0512LA | |
| | | | | | |
| Representative Test P/N : EFB0512HHA-F00 | | | | | |
| Instruments used: 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D | | | | | |

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

According to the equation for **Weibull distribution**, $MTTF \cong 7 \times L_{10} = 490,000$ 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,

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

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%), and

| Stress/Elevated Temperature T _s (°C) | 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 (hours) | Verified L ₁₀ (hours) |
|---|--|------------------------------------|----------------------------------|--|--|--|-----------------------|----------------------------------|
| 80 | 40 | 16.00 | 20 | 2.303 | 4,438 | 5,197 | 573,803 | 81,972 |

Test Progress:

| Date for Test Beginning | Date for Test Termination (at least) | Current Test Status | | | Current Total Test Time (hours) |
|-------------------------|--------------------------------------|-------------------------------------|--|---|---------------------------------|
| 2000/8/7 8:00 AM | 2001/2/8 6:00 AM | <input type="checkbox"/> In process | <input type="checkbox"/> In process (exceed requested) | <input checked="" type="checkbox"/> Termination | 5197 |

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 (°C) | Acceleration Factor A _F | Estimated MTTF (hours) | Estimated L ₁₀ (hours) |
|--------------------------------------|------------------------------------|------------------------|-----------------------------------|
| 25 | 45.25 | 1,622,960 | 231,851 |
| 30 | 32.00 | 1,147,606 | 163,944 |
| 40 | 16.00 | 573,803 | 81,972 |
| 50 | 8.00 | 286,901 | 40,986 |
| 60 | 4.00 | 143,451 | 20,493 |
| 70 | 2.00 | 71,725 | 10,246 |
| 80 | 1.00 | 35,863 | 5,123 |

Fan Failure Criteria:

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

| QE File No. | Time-out for function test or others (hours) | Issued Date | Reported By | Approved By |
|-------------|--|-------------------|--------------|-------------|
| A231L-05 | 1116 | 2001/4/27 9:00 AM | Bonnie Cheng | John Sun |

