# DC FAN LIFE EXPERIMENT REPORT

| | | | | | |
|---|---|---|---|---|---|
| Available for these models with lower speed and same physical structure. All model may be followed byRxx orFxx series suffixes. This test report applies to PFD 40X40X28**mm** series as the right table | | | | | |
| **Representative Test P/N :PFD0412ENJVN** | | | | | |
| **Equipment: 1.Oven: CK-1800** | | | | | |

◎ **$L_{10}$ 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) |
|---|---|---|---|---|---|---|---|---|
| 90 | 40 | 32.00 | 56 | 2.303 | 869 | 1,360.0 | 766,466 | 109,495 |

**Test Progress:**

| Date for Test Beginning | Date for Test Termination (at least) | Current Test Status | | | Current Total Test Time (hours) |
|---|---|---|---|---|---|
| **2024/5/18 3:30 PM** | 2024/8/29 1:26 PM | ☐ In process | ☐ In process (exceed requested) | ☑ Termination | **1360.0** |

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 | 90.51 | 2,167,893 | 309,699 |
| 30 | 64.00 | 1,532,931 | 218,990 |
| 40 | 32.00 | 766,466 | 109,495 |
| 50 | 16.00 | 383,233 | 54,748 |
| 60 | 8.00 | 191,616 | 27,374 |
| 70 | 4.00 | 95,808 | 13,687 |
| 80 | 2.00 | 47,904 | 6,843 |
| 90 | 1.00 | 23,952 | 3,422 |

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 Result | ☑ Accept ☐ Reject |
|---|---|

| QE File No. | Time-out for function test or others (hours) | Issued Date | Reported By | Approved By |
|---|---|---|---|---|
| DG24FNL039 | 1600.50 | 2024/9/19 | Poppy.Liang | Blandy.Yang |

BGN（dBA）: 16.2 Temp（℃）：26.0

# DC FAN FUNCTION TEST RECORD
# FOR LIFE EXPERIMENT

| | | | | | |
|---|---|---|---|---|---|
| Available for these models with lower speed and same physical structure. All model may be followed byRxx orFxx series suffixes. This test report applies to PFD 40X40X28mm series as the right table | | | | | |

| Required Test Time (hrs) | Date for Test Beginning | Date for Test Termination | Sample Size (pcs): | Failure (pcs): | Current Total Test Time (hrs) |
|---|---|---|---|---|---|
| 869 | 2024/5/18 3:30 PM | 2024/8/29 1:26 PM | 56 | 0 | **1360.0** |

| Representative Test P/N :PFD0412ENJVN | Current Test Status | ☐ In process | ☐ In process (exceed requested) | ☑ Termination |
|---|---|---|---|---|
| Equipment: 1.Oven: CK-1800 | | | | |

**Test Data Between Initial Test and Final Test**

| Sample No. | Initial Test Current Spec. ( A ) **5.5 Max.** | Final Test Current Spec. ( A ) **5.5 Max.** | Deviation (%) | Initial Test Speed Spec. ( RPM ) **40500-49500** | Final Test Speed Spec. ( RPM ) **40500-49500** | Deviation (%) | Initial Test Noise Spec. ( dB A ) **76.0Max** | Final Test Noise Spec. ( dB A ) **76.0Max** | Deviation **3 dBMax.** |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4. 78 | 4. 80 | 0.4 | 45746 | 45796 | 0.1 | 74.6 | 74.7 | 0.1 |
| 2 | 4. 64 | 4. 76 | 2.7 | 45140 | 45202 | 0.1 | 74.1 | 74.9 | 0.8 |
| 3 | 4. 89 | 4. 79 | -2.0 | 45935 | 44757 | -2.6 | 73.6 | 75.5 | 1.9 |
| 4 | 4. 83 | 4. 89 | 1.2 | 45894 | 45478 | -0.9 | 73.5 | 75.2 | 1.7 |
| 5 | 4. 60 | 4. 90 | 6.5 | 45365 | 45978 | 1.4 | 74.4 | 75.0 | 0.6 |
| 6 | 4. 64 | 4. 78 | 3.1 | 45388 | 44888 | -1.1 | 73.9 | 75.0 | 1.1 |
| 7 | 4. 61 | 4. 83 | 4.9 | 45963 | 45401 | -1.2 | 72.7 | 75.0 | 2.3 |
| 8 | 4. 80 | 4. 90 | 2.1 | 46097 | 45334 | -1.7 | 74.3 | 75.3 | 1.0 |
| 9 | 4. 81 | 4. 92 | 2.3 | 45576 | 45900 | 0.7 | 74.5 | 74.2 | -0.3 |
| 10 | 4. 60 | 4. 68 | 1.9 | 45367 | 45088 | -0.6 | 74.7 | 75.5 | 0.8 |
| 11 | 4. 68 | 4. 79 | 2.4 | 45855 | 46113 | 0.6 | 73.7 | 74.8 | 1.1 |
| 12 | 4. 77 | 5. 07 | 6.4 | 45843 | 46204 | 0.8 | 74.1 | 75.6 | 1.5 |
| 13 | 4. 73 | 4. 80 | 1.5 | 45699 | 45239 | -1.0 | 74.4 | 75.3 | 0.9 |
| 14 | 4. 87 | 4. 94 | 1.6 | 45612 | 45386 | -0.5 | 73.8 | 74.9 | 1.1 |
| 15 | 4. 73 | 4. 88 | 3.2 | 45958 | 45687 | -0.6 | 73.6 | 74.4 | 0.8 |
| 16 | 4. 94 | 4. 89 | -1.1 | 46288 | 45625 | -1.4 | 73.1 | 75.2 | 2.1 |
| 17 | 4. 62 | 4. 77 | 3.2 | 45302 | 45396 | 0.2 | 74.1 | 74.5 | 0.4 |
| 18 | 4. 64 | 4. 77 | 2.9 | 45467 | 45663 | 0.4 | 73.5 | 76.1 | 2.6 |
| 19 | 4. 82 | 4. 77 | -0.9 | 45964 | 45149 | -1.8 | 74.4 | 75.2 | 0.8 |
| 20 | 4. 82 | 4. 89 | 1.4 | 45864 | 45927 | 0.1 | 74.2 | 75.3 | 1.1 |
| 21 | 4. 90 | 4. 85 | -0.9 | 45548 | 45312 | -0.5 | 74.1 | 75.2 | 1.1 |
| 22 | 4. 73 | 4. 69 | -0.9 | 45494 | 45169 | -0.7 | 74.2 | 74.6 | 0.4 |
| 23 | 4. 81 | 4. 78 | -0.5 | 45855 | 44974 | -1.9 | 73.8 | 74.0 | 0.2 |
| 24 | 4. 81 | 5. 10 | 6.0 | 45827 | 45929 | 0.2 | 73.4 | 75.2 | 1.8 |
| 25 | 4. 85 | 4. 90 | 1.0 | 45584 | 45551 | -0.1 | 74.7 | 74.8 | 0.1 |
| 26 | 4. 82 | 4. 70 | -2.4 | 46027 | 44886 | -2.5 | 72.8 | 75.2 | 2.4 |
| 27 | 4. 90 | 4. 85 | -1.2 | 45990 | 46082 | 0.2 | 72.7 | 75.5 | 2.8 |
| 28 | 4. 96 | 5. 01 | 1.1 | 45827 | 45605 | -0.5 | 72.3 | 75.2 | 2.9 |
| 29 | 4. 67 | 4. 90 | 4.9 | 45873 | 45187 | -1.5 | 74.8 | 75.2 | 0.4 |
| 30 | 4. 98 | 4. 79 | -3.9 | 46136 | 45812 | -0.7 | 73.6 | 76.0 | 2.4 |
| 31 | 4. 72 | 4. 79 | 1.5 | 45854 | 45749 | -0.2 | 73.0 | 74.9 | 1.9 |
| 32 | 4. 75 | 4. 81 | 1.3 | 45464 | 45165 | -0.7 | 72.6 | 75.5 | 2.9 |

| QE File No. | Time-out for function test or others (hours) | Issued Date | Reported By | Approved By |
|---|---|---|---|---|
| **DG24FNL039** | **1600.50** | **2024/9/19** | **Poppy.Liang** | **Blandy.Yang** |

# DC FAN FUNCTION TEST RECORD
# FOR LIFE EXPERIMENT

| | | | | | |
|---|---|---|---|---|---|
| Available for these models with lower speed and same physical structure. All model may be followed byRxx orFxx series suffixes. This test report applies to PFD 40X40X28mm series as the right table | | | | | |

| Required Test Time (hrs) | Date for Test Beginning | Date for Test Termination | Sample Size (pcs): | Failure (pcs): | Current Total Test Time (hrs) | |
|---|---|---|---|---|---|---|
| 869 | 2024/5/18 3:30 PM | 2024/8/29 1:26 PM | 56 | 0 | **1360.0** | |
| Representative Test P/N :PFD0412ENJVN | | **Current Test Status** | ☐ In process | ☐ In process (exceed requested) | ☑ Termination | |
| Equipment: 1.Oven: CK-1800 | | | | | | |

**Test Data Between Initial Test and Final Test**

| Sample No. | Initial Test Current Spec. ( A ) **5.5 Max.** | Final Test Current Spec. ( A ) **5.5 Max.** | Deviation (%) | Initial Test Speed Spec. ( RPM ) **40500-49500** | Final Test Speed Spec. ( RPM ) **40500-49500** | Deviation (%) | Initial Test Noise Spec. ( dB A ) **76.0Max** | Final Test Noise Spec. ( dB A ) **76.0Max** | Deviation **3 dBMax.** |
|---|---|---|---|---|---|---|---|---|---|
| 33 | 4. 78 | 4. 86 | 1.7 | 45753 | 44980 | -1.7 | 74.6 | 76.0 | 1.4 |
| 34 | 4. 66 | 4. 87 | 4.4 | 45798 | 46144 | 0.8 | 75.0 | 75.4 | 0.4 |
| 35 | 4. 62 | 4. 70 | 1.7 | 45533 | 44824 | -1.6 | 74.2 | 74.1 | -0.1 |
| 36 | 4. 72 | 4. 83 | 2.2 | 45237 | 46093 | 1.9 | 73.6 | 74.5 | 0.9 |
| 37 | 4. 90 | 4. 95 | 1.0 | 45596 | 46088 | 1.1 | 75.1 | 74.6 | -0.5 |
| 38 | 4. 71 | 4. 79 | 1.8 | 45828 | 45364 | -1.0 | 73.5 | 75.8 | 2.3 |
| 39 | 4. 73 | 5. 02 | 6.2 | 46089 | 45785 | -0.7 | 74.4 | 74.7 | 0.3 |
| 40 | 4. 92 | 5. 06 | 2.7 | 45936 | 45541 | -0.9 | 74.7 | 75.3 | 0.6 |
| 41 | 4. 88 | 4. 70 | -3.8 | 45744 | 45193 | -1.2 | 74.1 | 74.8 | 0.7 |
| 42 | 4. 87 | 4. 96 | 1.8 | 46004 | 45853 | -0.3 | 74.6 | 75.7 | 1.1 |
| 43 | 4. 69 | 4. 79 | 2.1 | 45695 | 45723 | 0.1 | 74.7 | 75.3 | 0.6 |
| 44 | 4. 69 | 4. 90 | 4.6 | 45451 | 45982 | 1.2 | 74.7 | 75.4 | 0.7 |
| 45 | 4. 75 | 5. 09 | 7.3 | 46062 | 45890 | -0.4 | 74.8 | 74.6 | -0.2 |
| 46 | 4. 77 | 4. 88 | 2.4 | 45622 | 45258 | -0.8 | 74.7 | 74.6 | -0.1 |
| 47 | 4. 63 | 5. 00 | 7.9 | 45788 | 45872 | 0.2 | 74.0 | 75.6 | 1.6 |
| 48 | 4. 69 | 4. 74 | 1.2 | 45500 | 45447 | -0.1 | 74.8 | 75.3 | 0.5 |
| 49 | 4. 76 | 4. 79 | 0.5 | 45670 | 45265 | -0.9 | 74.6 | 73.9 | -0.7 |
| 50 | 5. 01 | 4. 87 | -2.9 | 45924 | 45303 | -1.4 | 74.4 | 75.0 | 0.6 |
| 51 | 4. 88 | 4. 98 | 2.0 | 46236 | 45000 | -2.7 | 74.2 | 75.4 | 1.2 |
| 52 | 4. 78 | 4. 81 | 0.7 | 45574 | 45436 | -0.3 | 73.7 | 74.6 | 0.9 |
| 53 | 4. 87 | 5. 14 | 5.6 | 45891 | 45571 | -0.7 | 73.7 | 75.0 | 1.3 |
| 54 | 4. 71 | 4. 71 | 0.0 | 45748 | 45039 | -1.5 | 72.3 | 74.5 | 2.2 |
| 55 | 4. 78 | 4. 91 | 2.7 | 45886 | 45701 | -0.4 | 75.0 | 74.3 | -0.7 |
| 56 | 4. 71 | 4. 78 | 1.5 | 45218 | 45775 | 1.2 | 75.7 | 75.5 | -0.2 |
| X-Bar | 4.77 | 4.86 | - | 45743 | 45514 | - | 74.0 | 75.1 | - |
| $\sigma$ | 0.11 | 0.11 | - | 264 | 381 | - | 0.7 | 0.5 | - |

| QE File No. | Time-out for function test or others (hrs) | Issued Date | Reported By | Approved By |
|---|---|---|---|---|
| **DG24FNL039** | **1600.50** | **2024/9/19** | **Poppy.Liang** | **Blandy.Yang** |