



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 FA 80x80x80.0 mm series as the right table	PFR0848HE-00E9A			
	FA482A08-J1A			
	PFR0848HE-00F4C			

Representative Test P/N : FA482A08-J06	
Equipment: 1.Oven: E24-T0167	On/Off Cycles: Every 500 hours

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

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

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%).

Stress/Elevated Temperature T _s (°C) <small>(Actual Test Temperature)</small>	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 40 °C (hours)	Verified L ₁₀ 40 °C (hours)
70	40	8.00	56	2.303	3,478	360.0	50,722	7,246

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2018/11/9 8:30 AM	2019/4/18 9:46 PM	<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination	360.0

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' 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.

Temperature for MTTF Estimation (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	22.63	143,463	20,495
30	16.00	101,444	14,492
40	8.00	50,722	7,246
50	4.00	25,361	3,623
60	2.00	12,680	1,811
70	1.00	6,340	906

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	<input checked="" type="checkbox"/> Accept <input type="checkbox"/> Reject
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QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG18FNL105	375.50	2018/12/10	Loly.Wang	Tim Yi



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	FA482A08-J1A				
	PFR0848HE-00F4C				

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2018/11/9 8:30 AM	2019/4/18 9:46 PM	56	0	360.0

Representative Test P/N : FA482A08-J06	Current Test Status	<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination
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Equipment: 1.Oven: E24-T0167	On/Off Cycles: Every 500 hours
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Test Data Between Initial Test and Final Test

Sample No.	Initial Test Current Spec. (A)	Final Test Current Spec. (A)	Deviation (%)	Initial Test Speed Spec. (RPM)	Final Test Speed Spec. (RPM)	Deviation (%)	Initial Test Noise Spec. (dB A)	Final Test Noise Spec. (dB A)	Deviation
	3.75 Max.	3.75 Max.		13500-16500 13500-16500	13500-16500 13500-16500		82.0 Max	82.0 Max	
1	2.60	2.62	1.0	14928	14923	0.0	75.4	75.6	0.2
				14975	14972	0.0			
2	2.60	2.59	-0.1	14967	14924	-0.3	75.3	76.8	1.5
				14974	15022	0.3			
3	2.58	2.61	1.4	14966	14926	-0.3	75.2	76.1	0.9
				14968	14996	0.2			
4	2.63	2.62	-0.5	14971	14938	-0.2	75.6	75.9	0.3
				14928	14910	-0.1			
5	2.58	2.53	-1.8	14954	14946	-0.1	75.9	76.0	0.1
				14981	14883	-0.7			
6	2.68	2.55	-4.7	14923	14941	0.1	75.7	75.3	-0.4
				14951	14960	0.1			
7	2.60	2.63	1.1	15038	14980	-0.4	74.9	75.5	0.6
				14946	14938	-0.1			
8	2.60	2.62	0.9	14953	14905	-0.3	75.7	76.0	0.3
				14945	14952	0.0			
9	2.60	2.48	-4.8	14998	14978	-0.1	74.8	75.0	0.2
				14960	14962	0.0			
10	2.64	2.65	0.4	14948	14916	-0.2	75.6	75.9	0.3
				14948	14960	0.1			
11	2.58	2.48	-4.0	14934	14973	0.3	75.4	75.1	-0.3
				14968	14995	0.2			
12	2.58	2.62	1.6	14959	14945	-0.1	76.5	76.3	-0.2
				14963	14976	0.1			
13	2.59	2.61	0.5	14976	14929	-0.3	76.4	76.5	0.1
				14983	14981	0.0			
14	2.61	2.58	-1.2	14849	14935	0.6	77.0	76.7	-0.3
				14958	15000	0.3			
15	2.57	2.57	0.0	14966	14894	-0.5	76.2	76.2	0.0
				14951	14940	-0.1			
16	2.64	2.70	2.3	14933	14956	0.2	76.2	76.0	-0.2
				15027	14961	-0.4			
17	2.59	2.49	-3.6	14999	15002	0.0	75.3	75.6	0.3
				14950	15001	0.3			
18	2.59	2.67	3.3	14955	14896	-0.4	75.2	75.2	0.0
				14943	14988	0.3			

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG18FNL105	375.50	2018/12/10	Loly.Wang	Tim Yi



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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				FA482A08-J1A					
				PFR0848HE-00F4C					
Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)				
3,478	2018/11/9 8:30 AM	2019/4/18 9:46 PM	56	0	360.0				
Representative Test P/N : FA482A08-J06			Current Test Status	<input checked="" type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input type="checkbox"/> Termination			
Equipment: 1.Oven: E24-T0167				On/Off Cycles: Every 500 hours					
Test Data Between Initial Test and Final Test									
Sample No.	Initial Test Current Spec. (A)	Final Test Current Spec. (A)	Deviation (%)	Initial Test Speed Spec. (RPM)	Final Test Speed Spec. (RPM)	Deviation (%)	Initial Test Noise Spec. (dB A)	Final Test Noise Spec. (dB A)	Deviation
	3.75 Max.	3.75 Max.		13500-16500	13500-16500		82.0 Max	82.0 Max	
19	2.58	2.53	-2.0	14937	14955	0.1	75.8	75.8	0.0
				14963	14958	0.0			
20	2.60	2.63	1.0	14914	14937	0.2	76.0	76.5	0.5
				14984	14980	0.0			
21	2.60	2.53	-2.8	14957	14954	0.0	76.3	76.4	0.1
				14969	14980	0.1			
22	2.60	2.60	0.1	14924	14955	0.2	74.3	76.1	1.8
				14977	15027	0.3			
23	2.56	2.60	1.8	14983	14976	0.0	75.0	76.0	1.0
				15007	14968	-0.3			
24	2.58	2.72	5.3	14940	14913	-0.2	76.2	75.1	-1.1
				14969	14940	-0.2			
25	2.58	2.51	-2.5	14918	14944	0.2	76.5	76.3	-0.2
				14963	14977	0.1			
26	2.57	2.62	1.8	14985	14897	-0.6	76.0	77.3	1.3
				14953	14948	0.0			
27	2.55	2.58	1.2	14977	14951	-0.2	74.6	75.3	0.7
				14970	14983	0.1			
28	2.58	2.65	2.7	14946	14945	0.0	75.7	75.2	-0.5
				14956	14986	0.2			
29	2.58	2.58	0.2	14957	14924	-0.2	76.5	77.6	1.1
				14935	15023	0.6			
30	2.57	2.58	0.3	14963	15034	0.5	76.1	77.6	1.5
				15017	14952	-0.4			
31	2.58	2.51	-2.5	14933	14947	0.1	75.0	75.8	0.8
				14985	14970	-0.1			
32	2.56	2.60	1.7	14955	14871	-0.6	76.2	76.3	0.1
				14942	14938	0.0			
33	2.53	2.54	0.5	14931	14967	0.2	75.2	76.1	0.9
				14993	14956	-0.2			
34	2.56	2.52	-1.3	14968	14954	-0.1	75.6	76.9	1.3
				14976	14961	-0.1			
35	2.62	2.58	-1.9	14977	14941	-0.2	75.0	75.4	0.4
				14952	14972	0.1			
36	2.56	2.60	1.7	14941	14943	0.0	75.5	75.8	0.3
				14971	14960	-0.1			
37	2.60	2.65	1.9	14974	14929	-0.3	76.1	76.6	0.5
				14995	15007	0.1			
QE File No.	Time-out for function test or others (hours)		Issued Date		Reported By		Approved By		
DG18FNL105	375.50		2018/12/10		Loly.Wang		Tim Yi		



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	3.75 Max.	3.75 Max.		13500-16500 13500-16500	13500-16500 13500-16500		82.0 Max	82.0 Max	
38	2.53	2.56	1.2	14931	14904	-0.2	75.5	76.5	1.0
				14979	14948	-0.2			
39	2.61	2.63	0.8	14955	14890	-0.4	76.0	76.2	0.2
				14952	14947	0.0			
40	2.60	2.59	-0.2	14939	14869	-0.5	75.2	75.3	0.1
				14975	14971	0.0			
41	2.64	2.58	-2.6	14934	14916	-0.1	75.6	76.1	0.5
				15001	14964	-0.2			
42	2.62	2.55	-2.7	14976	14930	-0.3	74.6	75.3	0.7
				14984	14945	-0.3			
43	2.65	2.62	-1.0	14957	14933	-0.2	75.2	76.1	0.9
				14982	14951	-0.2			
44	2.55	2.64	3.4	14933	14894	-0.3	75.6	76.3	0.7
				14960	14977	0.1			
45	2.62	2.53	-3.2	14983	14902	-0.5	76.2	76.4	0.2
				14942	14966	0.2			
46	2.63	2.51	-4.3	14947	14946	0.0	75.2	75.0	-0.2
				14949	14946	0.0			
47	2.62	2.60	-0.6	14968	14930	-0.3	75.5	76.4	0.9
				14987	14948	-0.3			
48	2.60	2.56	-1.6	14952	14958	0.0	74.8	76.0	1.2
				14968	14984	0.1			
49	2.60	2.51	-3.5	14942	14908	-0.2	75.1	75.8	0.7
				14955	14960	0.0			
50	2.65	2.61	-1.3	14978	14951	-0.2	76.0	76.5	0.5
				14985	14924	-0.4			
51	2.56	2.67	4.5	14936	14899	-0.2	75.6	75.5	-0.1
				14992	14940	-0.3			
52	2.62	2.60	-0.9	14931	14924	0.0	76.3	76.3	0.0
				14965	14984	0.1			
53	2.57	2.48	-3.5	14998	14963	-0.2	75.4	76.1	0.7
				14942	14942	0.0			
54	2.61	2.56	-1.8	14947	14923	-0.2	76.1	76.7	0.6
				14956	14967	0.1			
55	2.63	2.58	-1.6	14966	14867	-0.7	74.9	76.2	1.3
				14989	14964	-0.2			
56	2.65	2.65	0.0	14965	14917	-0.3	75.1	77.0	1.9
				14985	14999	0.1			
X-Bar	2.595	2.585	-	14961.4	0	-	75.60	76.06	-
σ	0.032	0.056	-	25.256	0	-	0.575	0.614	-

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DG18FNL105	375.50	2018/12/10	Loly.Wang	Tim Yi