SPECIFICATION FOR APPROVAL

Customer, ________________________________________________________________

Description. DC FAN

Part No. _____________________________________________________________

Delta Model No. AFC1212D-F00 REV. 02

Sample Issue No. _____________________________________________________________

Sample Issue Date. _____________________________________________________________

PLEASE SEND ONE COPY OF THIS SPECIFICATION BACK
AFTER YOU SIGNED APPROVAL FOR PRODUCTION PRE-ARRANGEMENT.

APPROVED BY:

DATE :

DELTA ELECTRONICS, INC.
TAOYUAN PLANT
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STATEMENT OF DEVIATION

- [ ] NONE
- [ ] DESCRIPTION:
**SPECIFICATION FOR APPROVAL**

Customer: 

**Description:** DC FAN

**Customer P/N:** 

**Delta Model No.:** AFC1212D-P00  
**Delta Safety Model No.:** AFC1212D

**Sample Rev:** 02  
**Issue No:**

**Sample Issue Date:** 

**Quantity:**

1. **SCOPE:**

   THIS SPECIFICATION DEFINES THE ELECTRICAL AND MECHANICAL CHARACTERISTICS OF THE DC BRUSHLESS AXIAL FLOW FAN. THE FAN MOTOR IS WITH TWO PHASES AND FOUR POLES.

2. **CHARACTERS:**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RATED VOLTAGE</strong></td>
<td>12 VDC</td>
</tr>
<tr>
<td><strong>OPERATION VOLTAGE</strong></td>
<td>10.2 - 13.8 VDC</td>
</tr>
<tr>
<td><strong>INPUT CURRENT</strong></td>
<td>0.53 (MAX. 0.80) A</td>
</tr>
<tr>
<td><strong>SAFETY CURRENT ON LABEL:</strong></td>
<td>0.80A</td>
</tr>
<tr>
<td><strong>INPUT POWER</strong></td>
<td>6.36 (MAX. 9.60) W</td>
</tr>
<tr>
<td><strong>SPEED</strong></td>
<td>3400 R.P.M. (REF.)</td>
</tr>
<tr>
<td><strong>MAX. AIR FLOW</strong></td>
<td>3.203 (MIN. 2.883) m³/Min.</td>
</tr>
<tr>
<td><strong>(AT ZERO STATIC PRESSURE)</strong></td>
<td>1131 (MIN. 101.81) CPM</td>
</tr>
<tr>
<td><strong>MAX. AIR PRESSURE</strong></td>
<td>10.92 (MIN. 8.85) mmH₂O</td>
</tr>
<tr>
<td><strong>(AT ZERO AIRFLOW)</strong></td>
<td>0.430 (MIN. 0.348) inchH₂O</td>
</tr>
<tr>
<td><strong>ACOUSTICAL NOISE (AVG.)</strong></td>
<td>46.5 (MAX. 49.5) dB-A</td>
</tr>
<tr>
<td><strong>INSULATION TYPE</strong></td>
<td>UL: CLASS A</td>
</tr>
</tbody>
</table>

(continued)
PART NO: [AFC1212D-F00]

**INSULATION STRENGTH**: 10 MEG OHM MIN. AT 500 VDC (BETWEEN FRAME AND (+) TERMINAL)

**DIELECTRIC STRENGTH**: 5 mA MAX. AT 500 VAC 50/60 Hz ONE MINUTE, (BETWEEN FRAME AND (+) TERMINAL)

**EXTERNAL COVER**: OPEN TYPE

**LIFE EXPECTANCE (L10)**

**AT LABEL VOLTAGE**: 70,000 HOURS CONTINUOUS OPERATION AT 40 °C WITH 15 ~ 65 %RH.

**OVER CURRENT SHUT DOWN**: THE CURRENT WILL SHUT DOWN WHEN LOCKING ROTOR.

**LEAD WIRE**: UL 1007 -F- AWG #24

BLACK WIRE NEGATIVE (-)

RED WIRE POSITIVE (+)

BLUE WIRE FREQUENCY (-F00)

YELLOW WIRE (PWM)

**NOTES:**

1. ALL READINGS ARE MEASURED AFTER STABLY WARMING UP THROUGH 10 MINUTES.

2. STANDARD AIR PROPERTY IS AIR AT (Td) 25°C TEMPERATURE, (RH) 65% RELATIVE HUMIDITY, AND (Pb) 760 mmHg BAROMETRIC PRESSURE.

3. THE VALUES WRITTEN IN PARENS , ( ), ARE LIMITED SPEC.

4. ACOUSTICAL NOISE MEASURING CONDITION:

**DC FAN**

AIR FLOW

**MICROPHONE**

1M

NOISE IS MEASURED AT RATED VOLTAGE IN FREE AIR IN ANECHOIC CHAMBER WITH B & K SOUND LEVEL METER WITH MICROPHONE AT A DISTANCE OF ONE METER FROM THE FAN INTAKE.
PART NO: AFC1212D-F00

3. MECHANICAL:

3-1. DIMENSIONS: SEE DIMENSIONS DRAWING

3-2. FRAME: PLASTIC UL: 94V-0

3-3. IMPELLER: PLASTIC UL: 94V-0

3-4. BEARING SYSTEM: TWO BALL BEARINGS

3-5. WEIGHT: 198 GRAMS

4. ENVIRONMENTAL:

4-1. OPERATING TEMPERATURE: -10 TO +60 DEGREE C

4-2. STORAGE TEMPERATURE: -40 TO +75 DEGREE C

4-3. OPERATING HUMIDITY: 5 TO 90 % RH

4-4. STORAGE HUMIDITY: 5 TO 95 % RH

5. PROTECTION:

5-1. LOCKED ROTOR PROTECTION
    IMPEDANCE OF MOTOR WINDING PROTECTS MOTOR FROM FIRE IN 96 HOURS OF LOCKED ROTOR CONDITION AT THE RATED VOLTAGE.

5-2. POLARITY PROTECTION
    BE CAPABLE OF WITHSTANDING IF REVERSE CONNECTION FOR POSITIVE AND NEGATIVE LEADS.

6. RE OZONE DEPLETING SUBSTANCES:

6-1. NO CONTAINING PBBs, PBBOs, CFCs, PBBEs, PBDPEs AND HCFCs.

7. PRODUCTION LOCATION

7-1. PRODUCTS WILL BE PRODUCED IN CHINA OR THAILAND.
8. BASIC RELIABILITY REQUIREMENT:

8-1. THERMAL CYCLING

LOW TEMPERATURE: -40°C
HIGH TEMPERATURE: +80°C
SOAK TIME: 30 MINUTES
TRANSITION TIME < 5 MINUTES
DUTY CYCLES: 5

8-2. HUMIDITY EXPOSURE

TEMPERATURE: +25°C ~ +65°C
HUMIDITY: 90~98% RH @ +65°C FOR 4 HOURS/CYCLE
POWER: NON-OPERATING
TEST TIME: 168 HOURS

8-3. VIBRATION

TEMPERATURE: +25°C
ORIENTATION: X, Y, Z
POWER: NON-OPERATING
VIBRATION LEVEL: OVERALL gRMS=3.2

<table>
<thead>
<tr>
<th>FREQUENCY (Hz)</th>
<th>PSD (g²/Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.040</td>
</tr>
<tr>
<td>20</td>
<td>0.100</td>
</tr>
<tr>
<td>40</td>
<td>0.100</td>
</tr>
<tr>
<td>800</td>
<td>0.002</td>
</tr>
<tr>
<td>1000</td>
<td>0.002</td>
</tr>
</tbody>
</table>

TEST TIME: 2 HOURS ON EACH ORIENTATION

8-4. MECHANICAL SHOCK

TEMPERATURE: +20°C
ORIENTATION: X, Y, Z
POWER: NON-OPERATING
ACCELERATION: 20 G MIN.
PULSE: 11 ms HALF-SINE WAVE
NUMBER OF SHOCKS: 5 SHOCKS FOR EACH DIRECTION

8-5. LIFE

TEMPERATURE: MAX, OPERATING TEMPERATURE
POWER: OPERATING
DURATION: 1000 HOURS MIN.
9. P & Q CURVE:

* TEST CONDITION: INPUT VOLTAGE --- OPERATION VOLTAGE
    TEMPERATURE --- ROOM TEMPERATURE
    HUMIDITY --- 65%RH

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PART NO:
DELTA MODEL: AFC1212D-F00

10. DIMENSION DRAWING:

LABEL:

DC BRUSHLESS
MODEL AFC1212D
DC12V 0.80A - F00

OR

DC BRUSHLESS
MODEL AFC1212D
DC12V 0.80A - F00

OR

DC BRUSHLESS
MODEL AFC1212D
DC12V 0.80A - F00

UNIT: mm(INCH)

UL 1007 -F- AWG #24
BLACK WIRE NEGATIVE(-)
RED WIRE POSITIVE(+)
BLUE WIRE FREQUENCY(-F00)
YELLOW WIRE (PWM)
11. FREQUENCY GENERATOR (FG) SIGNAL:

1. OUTPUT CIRCUIT - OPEN COLLECTOR MODE:

![Circuit Diagram]

CAUTION:
THE LEAD WIRE OF FG SIGNAL CAN NOT TOUCH
THE LEAD WIRE OF POSITIVE OR NEGATIVE.

2. SPECIFICATION:

\[ V_{CE}(\text{sat}) = 0.5V \text{ MAX.} \quad V_{FG} = 45VDC \text{ MAX.} \]

\[ I_C = 5mA \text{ MAX.} \quad R > \frac{V_{FG}}{I_C} \]

3. FREQUENCY GENERATOR WAVEFORM:

![Waveform Diagram]

FAN RUNNING FOR 4 POLES

\[ T_1 = T_2 = T_3 = T_4 = 1/4TS \]

\[ N = \text{R.P.M} \]

\[ TS = 60/N(\text{SEC}) \]

*VOLTAGE LEVEL AFTER BLADE LOCKED

*4 POLES

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12. PWM CONTROL SIGNAL:

**SIGNAL VOLTAGE RANGE: -0.8~20VDC**

High Level (V_{HIGH}): 2.8VDC MIN.

Low Level (V_{LOW}): 0.8 VDC MAX.

Duty Cycle = \( \frac{t}{T} \times 100(\%) \)

The fan will be controlled using a Pulse Width Modulated (PWM) signal from the electronics within the enclosure. The fan must accept a CMOS compatible PWM signal with a frequency range of 30Hz to 300kHz. The PWM signal will have a duty cycle from 0% to 100%. A 100% duty cycle will be defined as continuous logic high (V_{HIGH}) and will cause the fan to stop. A duty cycle of 0% will be defined as continuous logic low (V_{LOW}) and will cause the fan to spin at full speed.

13. SPEED VS PWM CONTROL SIGNAL: (AT RATED VOLTAGE & PWM FREQUENCY=20KHZ)

<table>
<thead>
<tr>
<th>Duty Cycle (%)</th>
<th>Speed (R.P.M)REF</th>
<th>Current (A)TYP</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>3400</td>
<td>0.53</td>
</tr>
<tr>
<td>75</td>
<td>3150</td>
<td>0.47</td>
</tr>
<tr>
<td>50</td>
<td>2420</td>
<td>0.33</td>
</tr>
<tr>
<td>25</td>
<td>1720</td>
<td>0.22</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>( \pm 0.02 )</td>
</tr>
</tbody>
</table>

14. The fan speed will default to maximum when the speed control input is left unconnected.
Application Notice

1. Delta will not guarantee the performance of the products if the application condition falls outside the parameters set forth in the specification.
2. A written request should be submitted to Delta prior to approval if deviation from this specification is required.
3. Please exercise caution when handling fans. Damage may be caused when pressure is applied to the impeller, if the fans are handled by the lead wires, or if the fan was hard-dropped to the production floor.
4. Except as pertains to some special designs, there is no guarantee that the products will be free from any such safety problems or failures as caused by the introduction of powder, droplets of water or encroachment of insect into the hub.
5. The above-mentioned conditions are representative of some unique examples and viewed as the first point of reference prior to all other information.
6. It is very important to establish the correct polarity before connecting the fan to the power source. Positive (+) and Negative (-). Damage may be caused to the fans if connection is with reverse polarity, if there is no foolproof method to protect against such error specifically mentioned in this spec.
7. Delta fans without special protection are not suitable where any corrosive fluids are introduced to their environment.
8. Please ensure all fans are stored according to the storage temperature limits specified. Do not store fans in a high humidity environment. We highly recommend performance testing is conducted before shipping, if the fans have been stored over 6 months.
9. Not all fans are provided with the Lock Rotor Protection feature. If you impair the rotation of the impeller for the fans that do not have this function, the performance of those fans will lead to failure.
10. Please be cautious when mounting the fan. Incorrect mounting of fans may cause excess resonance, vibration and subsequent noise.
11. It is important to consider safety when testing the fans. A suitable fan guard should be fitted to the fan to guard against any potential for personal injury.
12. Except where specifically stated, all tests are carried out at room (ambient) temperature and relative humidity conditions of 25°C, 65% RH. The test value is only for fan performance itself.
13. Be certain to connect an “4.7µF or greater” capacitor to the fan externally when the application calls for using multiple fans in parallel, to avoid any unstable power.