DELTA ELECTRONICS, INC.

252, SHANG YING ROAD, KUEI SAN TAOYUAN HSIEN 333, TAIWAN, R. O. C.

## SPECIFICATION FOR APPROVAL

TEL: 886-(0)3-3591968 FAX: 886-(0)3-3591991

Customer:		
Description: DC FAN		
Customer P/N:	REV:	
Delta Model NO.: PFR0912XHE-SP00		
Sample Rev: 00	Issue N0:	
Sample Issue Date: DEC.13.2010	Quantity:	

#### 1. SCOPE:

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

#### 2. CHARACTERS:

ITEM	DESCRIPTION
RATED VOLTAGE	12 VDC
OPERATION VOLTAGE	7.0 - 13.2 VDC
INPUT CURRENT	3.70 (MAX. 4.50) A
INPUT POWER	44.40 (MAX. 54.0) W
SPEED	11500 R.P.M. ±10%
MAX. AIR FLOW (AT ZERO STATIC PRESSURE)	5.255 (MIN. 4.729 ) M <sup>3</sup> /MIN. 185.55 (MIN. 166.98 ) CFM
MAX. AIR PRESSURE (AT ZERO AIRFLOW)	64.10 (MIN. 51.92 ) mmH <sub>2</sub> 0 2.523 (MIN. 2.044 ) inchH <sub>2</sub> 0
ACOUSTICAL NOISE (AVG.)	71 (MAX. 75.5) dB-A
INSULATION TYPE	UL: CLASS A
	1

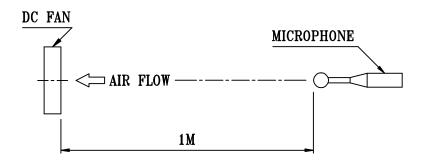
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	1
INSULATION STRENGTH	10 MEG OHM MIN. AT 500 VDC (BETWEEN FRAME AND (+) TERMINAL)
DIELECTRIC STRENGTH	5 mA MAX. AT 500 VAC 50/60 Hz ONE MINUTE, (BETWEEN FRAME AND (+) TERMINAL)
EXTERNAL COVER	OPEN TYPE
LIFE EXPECTANCE	70,000 HOURS CONTINUOUS OPERATION AT 40 °C WITH 15 ~ 65 %RH.
ROTATION	CLOCKWISE VIEW FROM NAME PLATE SIDE
OVER CURRENT PROTECTION	THE FAN WILL SHUT DOWN WHEN THE CURRENT IS ABNORMAL AND WILL RESTART AFTER 10 SECONDS
LEAD WIRE	UL 1007 -F- AWG #22 BLACK WIRE NEGATIVE(-) RED WIRE POSITIVE(+)
	UL 1007 -F- AWG #26 BLUE WIRE FREQUENCY(F00) YELLOW WIRE SPEED CONTROL(PWM)

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

- 2. THE VALUES WRITTEN IN PARENS, ( ), ARE LIMITED SPEC.
- 3. ACOUSTICAL NOISE MEASURING CONDITION:



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.

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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	260 GRAMS
4. ENVIRONMENTAL:	
4-1. OPERATING TEMPERATURE	10 TO +70 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 METALLISM HOURS OF LOCKED ROTOR CONDITION AT THE	
5-2. POLARITY PROTECTION	
BE CAPABLE OF WITHSTANDING IF REVERSE AND NEGATIVE LEADS.	CONNECTION FOR POSITIVE

- 6. RE OZONE DEPLETING SUBSTANCES:
  - 6-1. NO CONTAINING PBBs, PBB0s, CFCs, PBBEs, PBDPEs AND HCFCs.
- 7. PRODUCTION LOCATION
  - 7-1. PRODUCTS WILL BE PRODUCED IN CHINA OR THAILAND OR TAIWAN.

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## 8. BASIC RELIABILITY REQUIREMENT:

8-1. THERMAL	LOW TEMPERATURE: -40°C
CYCLING	HIGH TEMPERATURE: +80°C
	SOAK TIME: 30 MINUTES
	TRANSITION TIME < 5 MINUTES
	DUTY CYCLES: 5

8-2. HUMIDITY TEMPERATURE: 60°C EXPOSURE HUMIDITY: 95%

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

FREQUENCY(Hz)	PSD(G <sup>2</sup> /Hz)
10	0.040
20	0.100
40	0.100
800	0.002
1000	0.002

TEST TIME: 2 HOURS ON EACH ORIENTATION

8-4. MECHANICAL TEMPERATURE: +20°C SHOCK ORIENTATION: X, Y, Z

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.

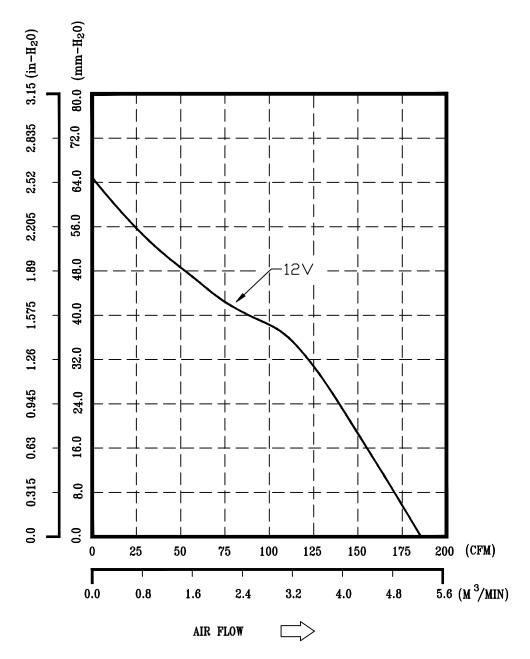
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8. P & Q CURVE:



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

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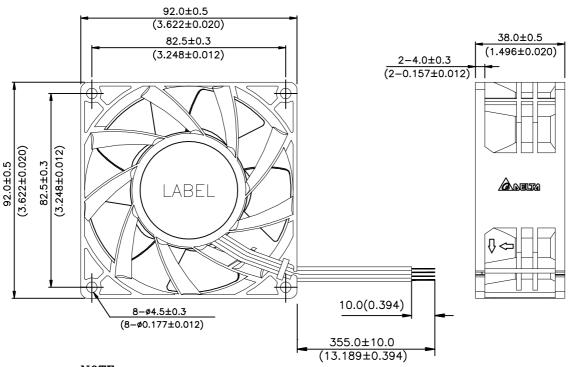
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#### 9. DIMENSION DRAWING:

#### LABEL:





NOTE:

1. LEAD WIRE UL 1061 -F- AWG #22
BLACK WIRE NEGATIVE(-)
RED WIRE POSITIVE(+)
LEAD WIRE UL 1061 -F- AWG #26
BLUE WIRE FREQUENCY(F00)
YELLOW WIRE SPEED CONTROL(PWM)

UNIT: mm(INCH)

2. THIS PRODUCT IS RoHS COMPLIANT

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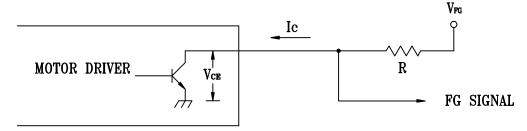
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## 10. FREQUENCY GENERATOR (FG) SINGAL:

10-1. OUTPUT CIRCUIT - OPEN COLLECTOR MODE:



#### **CAUTION:**

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

10-2. SPECIFICATION:

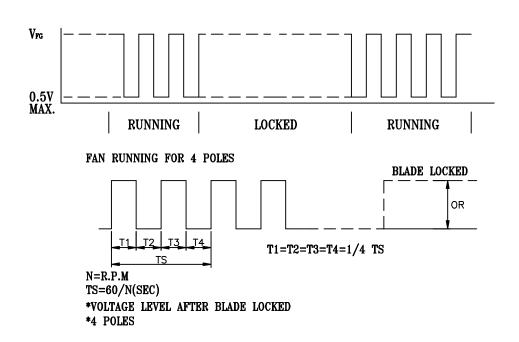
Vce (sat)=0.5V MAX.

 $V_{FG} = 13.2 \text{VDC MAX}.$ 

 $I_c = 5mA MAX.$ 

R≥V<sub>FG</sub>/I<sub>C</sub>

10-3. FREQUENCY GENERATOR WAVEFORM:



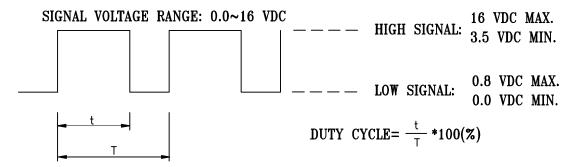
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11. PWM CONTROL SIGNAL:



- THE FREQUENCY FOR CONTROL SIGNAL OF THE FAN SHALL BE ABLE TO ACCEPT AT 50 HZ~100K HZ.
- THE PREFERRED OPERATING POINT FOR THE FAN IS 25K HZ.
- AT 100% DUTY CYCLE, THE ROTOR WILL SPIN AT MAXIMUM SPEED.
- AT 0% DUTY CYCLE, THE ROTOR WILL STOP.
- WHEN THE CONTROL SIGNAL LEAD IS DISCONNECTED, THE FAN WILL SPIN AT MAXIMUM SPEED.

#### 12. SPEED VS PWM CONTROL SIGNAL: (AT RATED VOLTAGE & PWM FREQUENCY=25KHZ)

DUTY CYCLE (%)	SPEED R.P.M. (REF.)	CURRENT (A) TYP. (REF.)
100	11500 ± 10%	3.7
0	0	0

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# **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 " $4.7\mu F$  or greater" capacitor to the fan externally when the application calls for using multiple fans in parallel, to avoid any unstable power.

Doc. No: FMBG-ES Form 001 Rev. 0001 Date: June 24, 2009