



## SPECIFICATION FOR APPROVAL

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**Customer** \_\_\_\_\_

**Description** DC FAN

**Part No.** \_\_\_\_\_ **Rev.** \_\_\_\_\_

**Delta Model No.** GFC0412DS-TP01 **Rev.** 02

**Sample Issue No.** \_\_\_\_\_

**Sample Issue Date.** Feb 06, 12

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

APPROVED BY : \_\_\_\_\_

DATE : \_\_\_\_\_

**DELTA ELECTRONICS (THAILAND) PUBLIC COMPANY LIMITED.**  
111 MOO 9 WELLGROW INDUSTRIAL ESTATE  
BANGNA-TRAD ROAD, TAMBON BANGWUA,  
AMPHUR BANGPAKONG, CHACHOENSAO 24180 THAILAND  
TEL. +66-(0)-38522455, FAX. +66-(0)-38522477

DELTA ELECTRONICS (THAILAND) PCL.  
 111 MOO 9, WELLGROW INDUSTRIAL ESTATE,  
 BANGNA-TRAD ROAD, BANGWUA, BANGPAKONG,  
 CHACHEONGSAO 24180 THAILAND.

TEL : +66-(0)38-522455  
 FAX : +66-(0)38-522477

SPECIFICATION FOR APPROVAL  
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Customer: \_\_\_\_\_  
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 Description: DC FAN  
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 Customer P/N: \_\_\_\_\_ REV: \_\_\_\_\_  
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 Delta Model NO.: GFC0412DS-TP01  
 -----  
 Sample Rev: 02 Issue NO: \_\_\_\_\_  
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 Sample Issue Date: Feb 06, 12 Quantity: \_\_\_\_\_  
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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		5.5 - 13.2 VDC
INPUT CURRENT		1.00 (MAX. 1.20) A
INPUT POWER		12.00 (MAX.14.40) W
SPEED	SINGLE RUN	FRONT 15300±10%RPM / REAR 13000±10%RPM
	BOTH RUN	FRONT 15300±10%RPM / REAR 11300±10%RPM
MAX. AIR FLOW (AT ZERO STATIC PRESSURE)		0.864 (MIN. 0.777) M <sup>3</sup> /MIN. 30.50 (MIN. 27.45) CFM
MAX. AIR PRESSURE (AT ZERO AIRFLOW)		43.83 (MIN. 35.50) mmH <sub>2</sub> O 1.726 (MIN. 1.398) inchH <sub>2</sub> O
ACOUSTICAL NOISE (AVG.)		61.0 ( MAX. 65.0 ) dB-A
INSULATION TYPE		UL: CLASS A

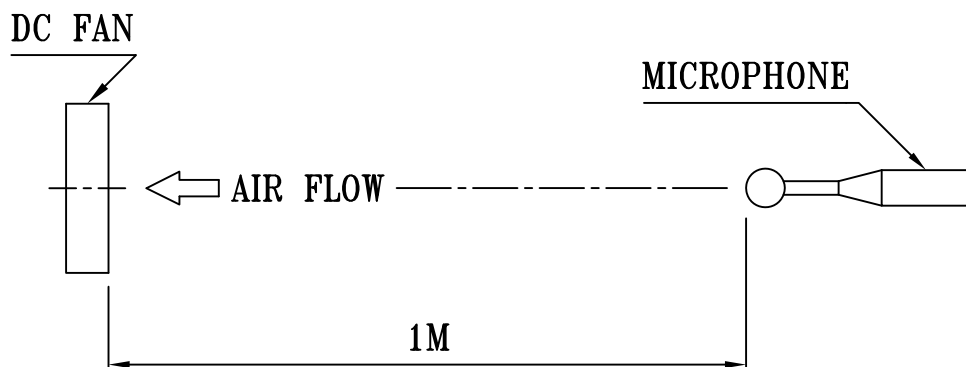
(continued)

PART NO:

DELTA MODEL: GFC0412DS-TP01

INSULATION STRENGTH	10 MEG OHM MIN. AT 500 VDC (BETWEEN FRAME AND (+) TERMINAL)
DIELECTRIC STRENGTH	5 mA MAX. AT 500 VAC 60 Hz ONE MINUTE, (BETWEEN FRAME AND (+) TERMINAL)
EXTERNAL COVER	OPEN TYPE
LIFE EXPECTANCE	L10, 70000 HOURS AT 40 °C WITH 15 ~ 65 %RH.
ROTATION	TWO FANS ROTATE IN COUNTER DIRECTIONS SHOWED IN THE NAME PLATE SIDE
OVER CURRENT SHUT DOWN	THE CURRENT WILL SHUT DOWN WHEN LOCKING ROTOR.
LEAD WIRE	UL 1061 -F- AWG #28 FRONT FAN(FIVE BLADES): REAR FAN(FOUR BLADES): RED WIRE POSITIVE(+) ORANGE WIRE POSITIVE(+) BLACK WIRE NEGATIVE(-) BROWN WIRE NEGATIVE(-) BLUE WIRE FREQUENCY(-F00) YELLOW WIRE FREQUENCY(-F00) GREEN WIRE (-PWM) WHITE WIRE(-PWM)

- NOTES: 1. ALL READINGS ARE MEASURED AFTER STABLY WARMING UP THROUGH 10 MINUTES.  
2. THE VALUES WRITTEN IN PARENS , ( ), ARE LIMITED SPEC.  
3. THE CHARACTERS SHOWED IN PAGE 1 IS THE CONDITION OF BOTH FANS RUN.  
4. 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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PART NO:  
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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 ----- FOUR BALL BEARINGS
- 3-5. WEIGHT ----- 90 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

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, 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 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

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

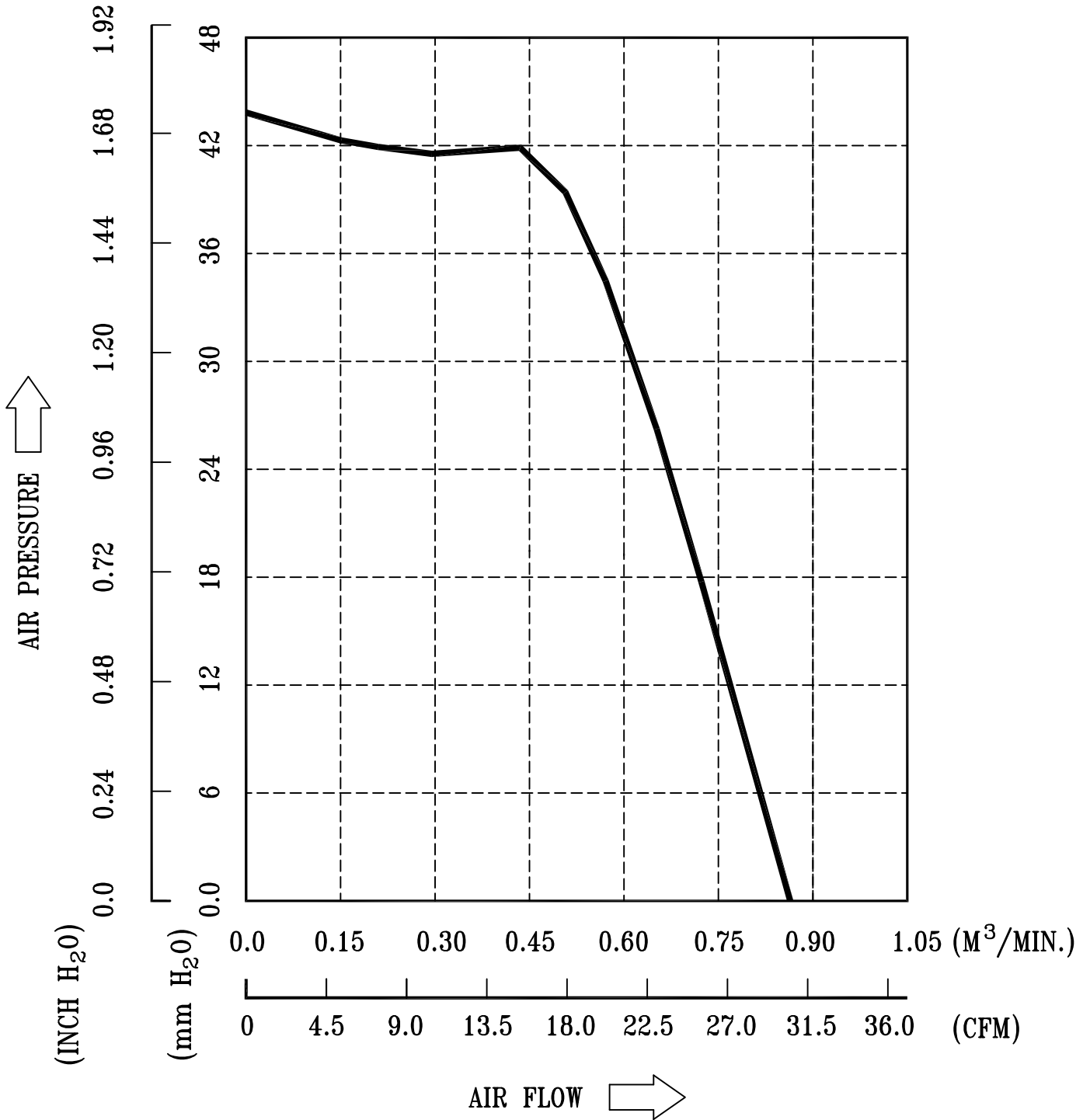
8-4. MECHANICAL SHOCK    TEMPERATURE: +20°C  
                              ORIENTATION: X, Y, Z  
                              POWER: NON-OPERATING  
                              ACCELERATION: 20 G MIN.  
                              PULSE: 11 ms HALF-SINE WAVE  
                              NUMBER OF SHOCKS: 5 SHOCKS  
  FOR EACH DIRECTION

8-5. LIFE                    TEMPERATURE: MAX , OPERATING TEMPERATURE  
                              POWER: OPERATING  
                              DURATION: 1000 HOURS MIN.

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9. P & Q CURVE:



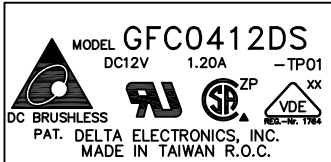
\* TEST CONDITION: INPUT VOLTAGE ----- OPERATION VOLTAGE  
TEMPERATURE ----- ROOM TEMPERATURE  
HUMIDITY ----- 65%RH

PART NO:

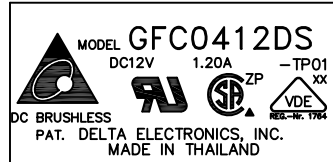
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### 10. DIMENSION DRAWING:

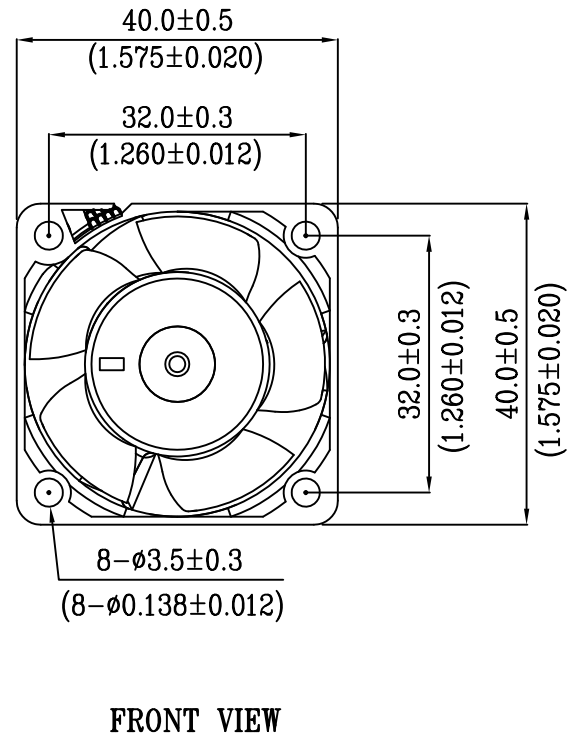
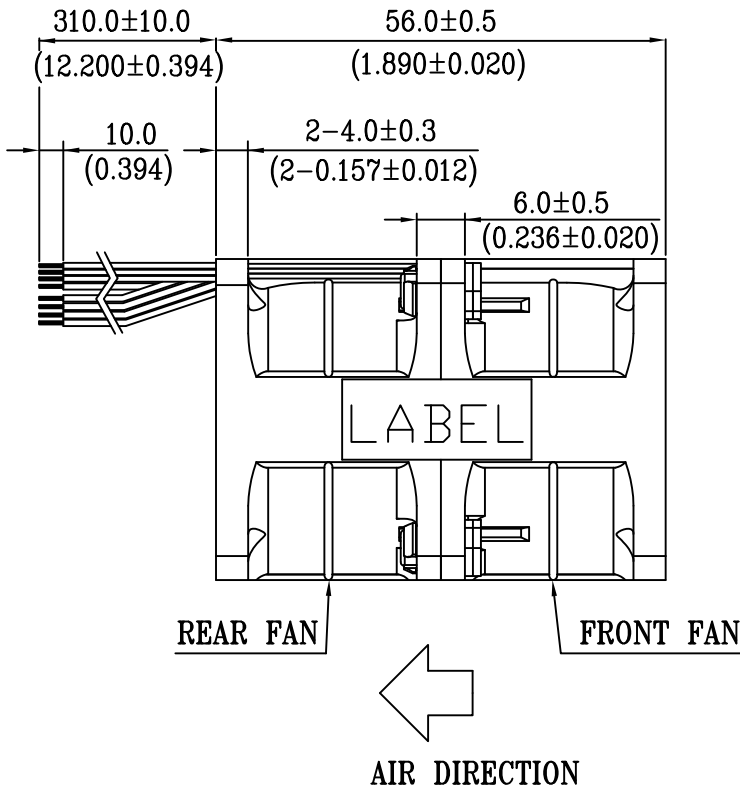
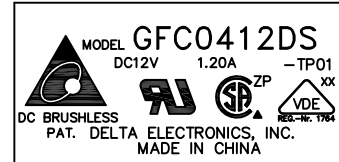
LABEL:



OR



OR



#### NOTES:

1. WIRE: UL1061 AWG#28

FRONT FAN(FIVE BLADES):

RED WIRE POSITIVE(+)

BLACK WIRE NEGATIVE(-)

BLUE WIRE FREQUENCY(-F00)

GREEN WIRE (-PWM)

REAR FAN(FOUR BLADES):

ORANGE WIRE POSITIVE(+)

BROWN WIRE NEGATIVE(-)

YELLOW WIRE FREQUENCY(-F00)

WHITE WIRE(-PWM)

2. THIS PRODUCT IS RoHS COMPLIANT

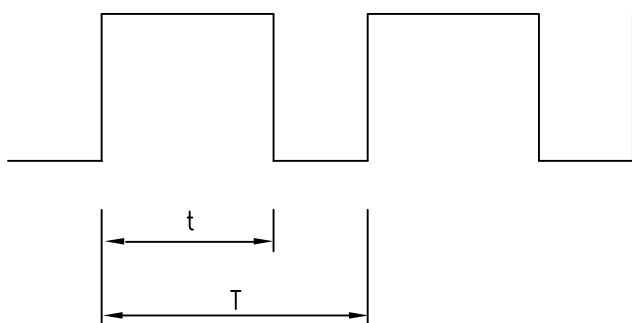
DIMENSION UNIT: MM(INCH)

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PART NO:  
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12. PWM CONTROL SIGNAL:

SIGNAL VOLTAGE RANGE: 0~20VDC



----- HIGH SIGNAL: 20 VDC MAX.  
2.8 VDC MIN.

----- LOW SIGNAL: 0.8 VDC MAX.  
0 VDC MIN.

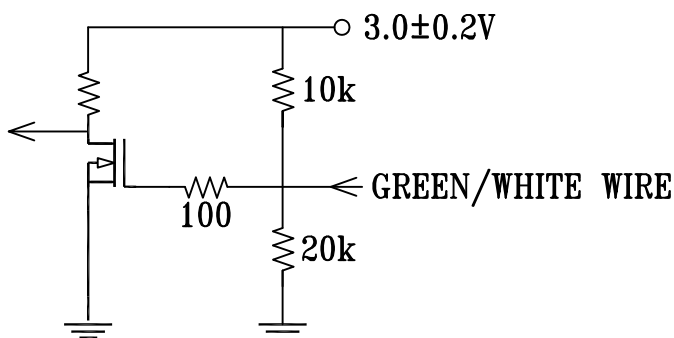
$$\text{DUTY CYCLE} = \frac{t}{T} * 100(\%)$$

- THE FREQUENCY FOR CONTROL SIGNAL OF THE FAN SHALL BE ABLE TO ACCEPT A 30HZ~300KHZ.
- THE PREFERRED OPERATING POINT FOR THE FAN IS 25K HZ.
- AT 100% DUTY CYCLE,THE ROTOR WILL SPIN AT MAXIMUM SPEED.
- WITH CONTROL SIGNAL LEAD DISCONNECTED,THE FAN WILL SPIN AT MAXIMUM SPEED.
- AT 25K HZ 30% DUTY CYCLE ,THE FAN WILL BE ABLE TO STAR FROM A DEAD STOP .

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

DUTY CYCLE (%)	SPEED R.P.M. (REF.)
100	15300±10%/11300±10%
50	8250±10%/5750±10%
0~12	4400±12%/3000±12%

14. PWM CONTROL LEAD WIRE INPUT IMPEDANCE:



14-1. THE FAN SPEED WILL DEFAULT TO MAXIMUM WHEN THE SPEED CONTROL INPUT IS LEFT UNCONNECTED.

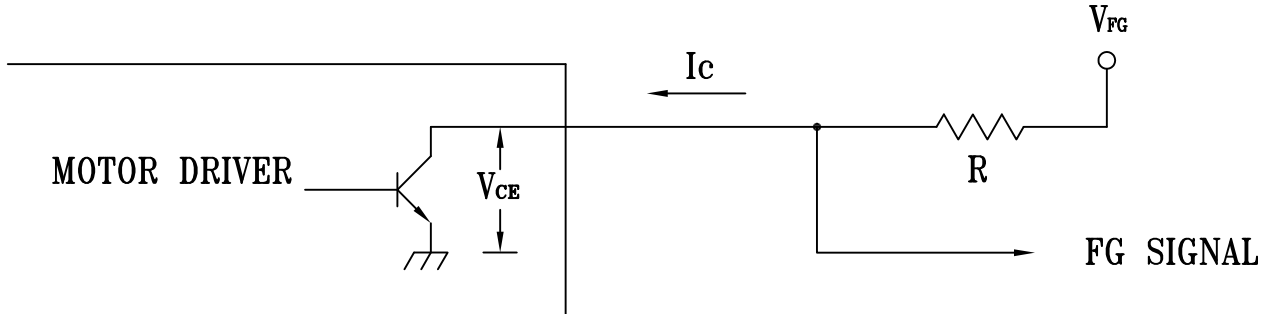


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11. FREQUENCY GENERATOR (FG) SIGNAL:

1. OUTPUT CIRCUIT - OPEN COLLECTOR MODE:



CAUTION:

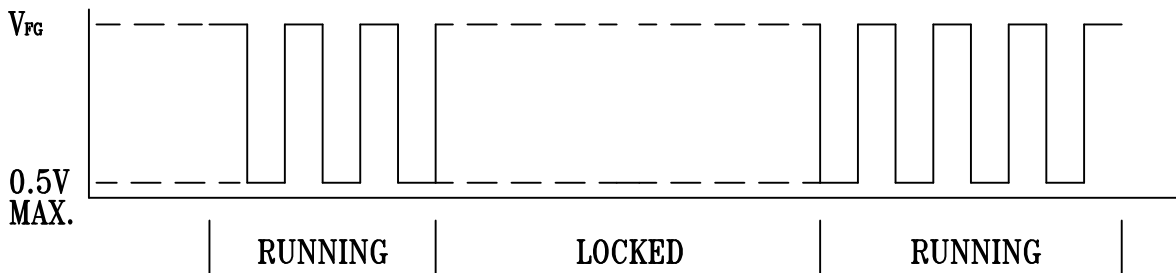
THE LEAD WIRE OF FG SIGNAL CAN NOT TOUCH  
THE LEAD WIRE OF POSITIVE OR NEGATIVE.

2. SPECIFICATION:

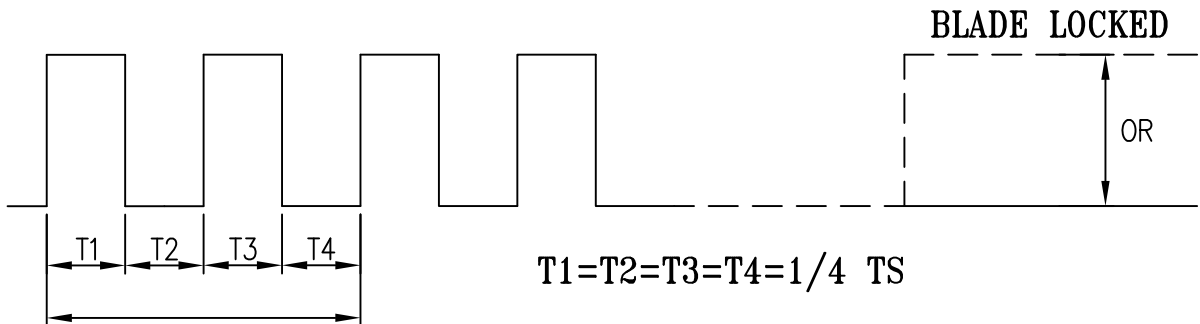
$V_{CE}(\text{sat}) = 0.5V \text{ MAX.}$        $V_{FG} = 12.0 \text{ TYP.}(V_{CC} \text{ MAX.})$

$I_c = 5\text{mA MAX.}$        $R \geq V_{FG}/I_c$

3. FREQUENCY GENERATOR WAVEFORM:



FAN RUNNING FOR 4 POLES



$$T_1 = T_2 = T_3 = T_4 = 1/4 \text{ TS}$$

$N = \text{R.P.M}$        $TS$

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

\*VOLTAGE LEVEL AFTER BLADE LOCKED

\*4 POLES



## ***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.**