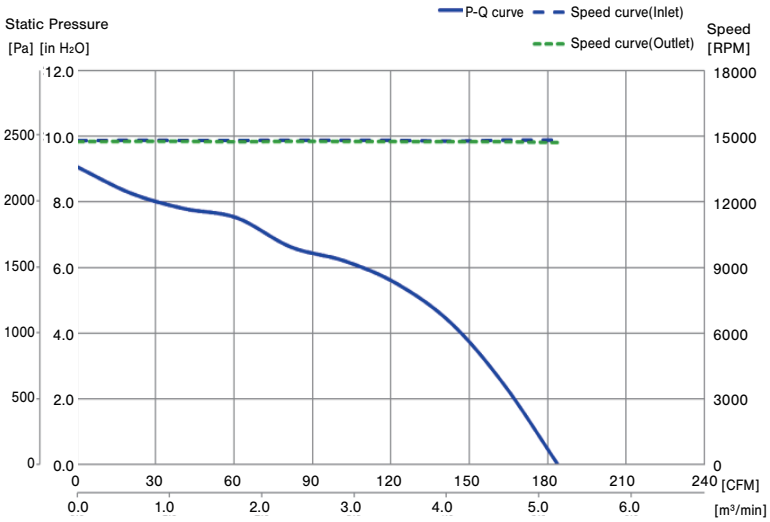
DC BRUSHLESS AXIAL FAN

R80H54BS2PC-07

The UltraFlo series is a fan lineup that achieves high airflow, low power consumption, and long lifespan, boasting the world's top share in the communication IT field. The highly reliable fan motor is widely used in various applications. In addition to its expertise in precision small motors, it combines wind tunnel design and circuit design with safety mechanisms, offering a wide range of sizes from 1U to 4U. The lineup also includes dual-reverse fans to meet the high static pressure area required to send air into high-density enclosures, providing an effective means to increase redundancy.

■ CHARACTERISTIC CURVES



■ FEATURES

- 80 x 80 mm 54 VDC Brushless Fan
- High Airflow (184.5 CFM @ 5.22 m^3 /min)
- Low Current Consumption 2.74 A (Nominal) 3.01 A (Peak)
- Long Lifespan 70,000 hours
  @ 40°C & 65 % R.H. (L10 Expectancy)
- Ball Bearings
- Counter Rotor Fan
- PWM Speed Control With Tach Output

1. MECHANICAL SPECIFICATIONS

1-1	External dimensions	Refer to outline dimensions
1-2	Housing material	PBT (UL V-0)
	Impeller material	PBT (UL V-0)
1-3	Bearing	Ball bearings
1-4	Mass	About 465 g
1-5	Life expectancy L10	70,000 hours 1) At 40°C (65 % R.H.), continuous operation at rated voltage. 2) Life is defined when the motor speed decreases more than 30% against its initial speed.

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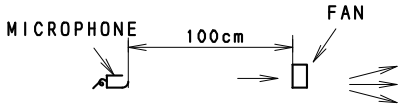
2. ELECTRICAL SPECIFICATIONS

No	Item \ Part number	R80H54BS2PC-07	Remarks
2-1	Rated voltage	54 VDC	
2-2	Operating range	40.0~60.0 V	(Note 5)
2-3	Current consumption	Max.3.01 A 2.74 A (Nominal)	In free air at rated voltage (Note 4) (Note 6)
2-4	Power consumption	Max.162.5 W 148.0 W (Nominal)	In free air at rated voltage
2-5	Rated speed	Min. 13320 min^{-1} 14800 min^{-1} (Nominal) Max. 16280 min^{-1}	In free air at rated voltage Intake side (Note 4)
2-6	Maximum air flow	Min. 4.70 m^3 /min (166.1 CFM) 5.22 m^3 /min (184.5 CFM)	At rated voltage At zero static pressure (Note 4)
2-7	Maximum static pressure	Min.1768 Pa (7.10 inch-H_2O) 2183 Pa (8.77 inch-H_2O)	At rated voltage At zero air flow (Note 4)
2-8	Acoustic noise	Max. 91 dB (A) 87 dB (A) (Nominal)(Ref)	In free air at rated voltage (A scale, slow) (Anechoic room) 
2-9	Operating temperature	-10°C~70°C (Normal humidity)	
2-10	Storage temperature	-40°C~75°C (Normal humidity)	Standards for Items 2-3~2-10 should be met when measured after having sat for 24 hours at room temperature for fans subjected to specified temperature range for 100 hours.
2-11	Direction of rotation	Inlet : CCW Outlet : CCW From air intake of fan	
2-12	Direction of air flow	label side discharge	
2-13	Insulation resistance	Min.10 MΩ	At 500 VDC between frame and leads
2-14	Dielectric strength	Must withstand 500 VAC 1min	Max. 1mA between frame and leads (Usually inspect at 600 VAC,1 sec,1 mA)
2-15	Protection	Current limit protection	(Note 2)
		Reverse polarity protection	(Note 3)
		Hot swap	

- Note 1: The above standard should be the specified value at normal temperature (23°C) and normal humidity (60~65%) unless otherwise notice.
- Note 2: In the case that power is turned on during fan rotor is locked, the fan shall attempt to restart at a typical repetition rate (Temperature rise will be prevented). The fan will automatically restart when the locked rotor condition is released.
- Note 3: Power supply voltage must not be applied between signal output line and any other line directly. Reverse polarity protection is effective to just switch the positive and negative power line.
- Note 4: Control signal (Blue & green lead wires) should be applied 2.6 to 6.0 V or should be open.
- Note 5: 40 V~60 V operating voltage range is for continuous DC voltage. Power supply voltage ripple 5% maximum.

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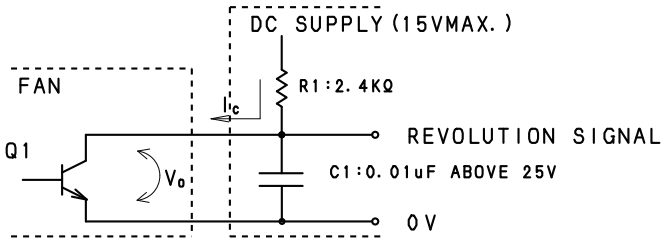
3. PROVISION OF REVOLUTION SIGNAL

3-1 OUTPUT OF REVOLUTION SIGNAL

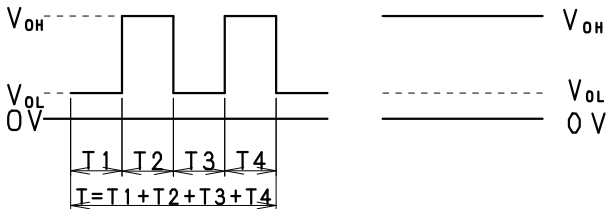
● Output type: open collector type
● Electrical specification



Remark: As for measuring V_{OL}, it is necessary to put cr low pass filter which is constructed of R1 and C1. The time constant of R1 x C1 is to be more than 24 us such as R1=2.4 kΩ C1=0.01 uF.

● Absolute maximum specification
Collector current I_C=10 mA Max.
Release Voltage V_{OH} = 15 V Max.
● Electrical characteristics
Saturation Voltage V_{OL}= 0.5 V Max.
At I_C=5 mA

● Output waveform
(At revolution) (At locked position)



Remark: At locked position, output becomes V_{OH} OR V_{OL}.
$T=T_1+T_2+T_3+T_4=60/N$ (Sec)
N: Fan Speed (min^{-1})
$DUTY = T_1 / T_1+T_2 = 50\pm10\%$

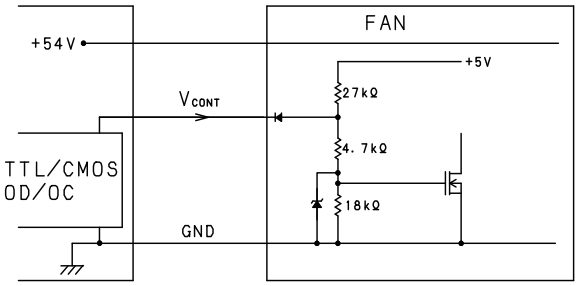
3-2 ⚠ CAUTION

Please be careful that revolution signal lead wire (Yellow & white wire) shall not have any voltage directly applied. (It should damage inner circuit.)

4. PWM CONTROL

4-1 TYPE

The method of active/inactive drive mosfet for speed control.



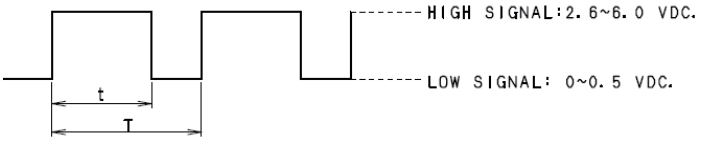
※ OD/OC=Open drain/Open collector

*Actual machine side is TTL/CMOS PWM controlled.

V_{CONT} is above 2.6 V ⋯ Fan should run maximum speed.
V_{CONT} is below 0.5 V ⋯ Fan should run minimum speed.
Control wire should accept PWM control, PWM frequency is from 20 kHz to 32 kHz.

4-2 PWM CONTROL SIGNAL

Signal voltage range: 0~6.0 VDC



Duty cycle = t / T × 100(%)

The frequency for control signal of the fan shall be able to accept at 20 kHz-32 kHz.
PWM signal with 3.3 VDC TTL/COMS level. The preferred operating point for the fan is 25 kHz, and duty cycle from 0% to 100%.

If the PWM control wire connect to ground, the rotor will spin at minimum speed.

At 100% duty cycle, the rotor will spin at maximum speed.
If the PWM control wire open, the rotor will spin at maximum speed.

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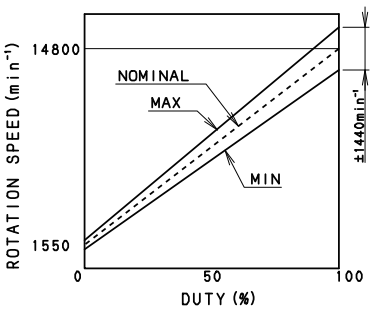
4-3 SPEED VS PWM CONTROL SIGNAL, AT RATED VOLTAGE



Detail of PWM curve(Inlet&Outlet side)

Duty cycle (Positive) (%)	Speed (min^{-1}) Inlet&Outlet side
0	1500±300
50	7300±730
70	10700±1070
80	12200±1220
100	14800±1480

Note: The standards should be the specified value at normal temperature (23°C) and normal humidity (60~65%), free air and 54V 25 kHz unless otherwise notice.

5. SPECIAL TEST

5-1 VIBRATION TEST

Standards for items 2-3~2-8 and 6-2 should be met after 30 minutes 0.2 mm amplitude, 55 Hz vibration in each direction: up-down, right-left, forward-back, in non-operating condition.

5-2 SHOCK TEST

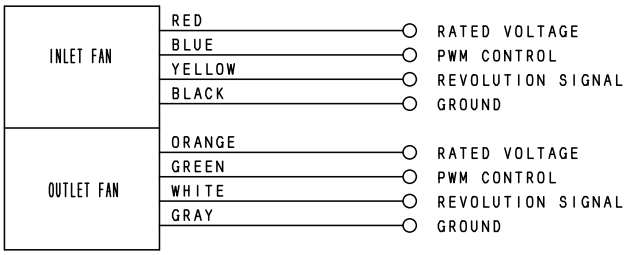
Standards for items 2-3~2-8 and 6-2 should be met if the fans fall naturally from a height of 30 cm in the packing box for each direction.

*Dimensions of Packing Box (W x D x H) :

360 x 540 x 220 (mm)

6. OTHERS

6-1 CONNECTION



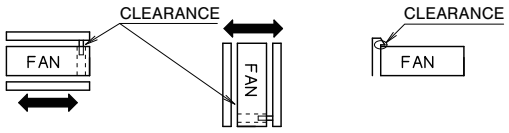
6-2 LOCKED ROTOR

No damage shall be found for continuous 1 hour at locked rotor.

■ HANDLING WARNING

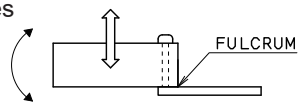
1. IMPORTANT POINTS DURING INSTALLMENT

⚠ • Because the clearance at fan's mounting portion might impact on the noise and vibration during fan's rotation, the screw or rivet should be used for installation.In case of snap-fit type, please be careful not to make the clearance during installation.

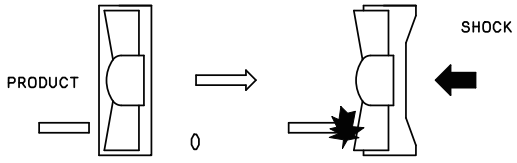


⚠ • The vibration to the axial direction might increase in case that the fan is installed at one end support. Please do not install the fan at one end support. The 4-points fixing should be recommended.

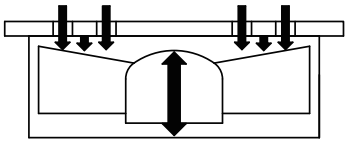
Based on the principle of a lever, the force becomes larger in case that the distance between fulcrum and power point is larger.



⚠ • If your parts are closely put in front of the fan motor, it might contact with the impeller when the impact force is applied. The recommended distance between your parts and the fan motor could be 3mm or more.

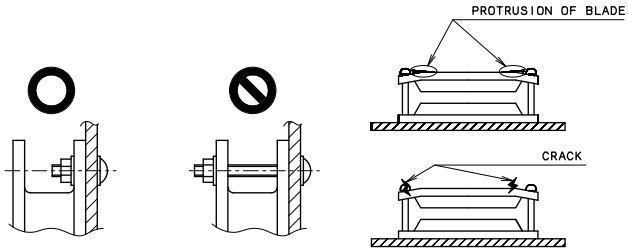


⚠ • If the product is closely put in front of the fan motor, the vibration and noise might increase due to vibration caused by air flow separation. The recommended distance between the product and the fan motor could be 3mm or more.

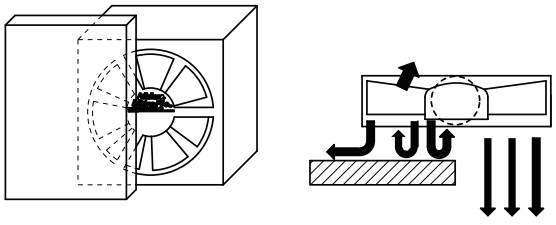


There are high and small pressure layers in front of the blade, where the blades pass through alternately. It causes the increase in vibration.

⚠ • The through screw should not be used for open-flange-type fan motor because the deformation or crack might be caused at housing flange area when it is used. Please use a flange at only one side in case of the open-flange-type.



⚠ • The uneven load is applied on bearing in case the exhaust outlet is closed unevenly, which might cause the uneven wear on bearing. Your consideration to make the air flow even at the exhaust outlet is highly appreciated.



The static pressure is added only on certain portion, and the uneven wear is caused on bearing .

• The housing could be damaged in case of using the self-tapping screw which is not suitable for installation of plastic parts. "Tap tight p tight " for plastic parts should be recommended for usage in case of the self-tapping installation.

⚠ • The housing might be deformed, the impeller might go out from the housing and might contact with the installation area in case the fan motor is installed on the poor flatness area using the screw. The flatness at installation area should be 0.1mm or less.
• In case that you use the fan motor with different usage recommended in the above, please conduct the sufficient investigation before use.

2. PRECAUTIONS

• The shut-down circuit might operate wrongly under the large static electricity or EM noise. In this case, the restart type should be recommended.

• In case of reducing the fan's rotation speed by resistor, the voltage on fan terminal changes, and its voltage (Lower value) might go down to the fan's usage voltage range. In this case, various issues might happen such as no rotation of fan motor, unstable rotation, and sensor's wrong operation.

• When you request to add the relay or alarm circuit in fan motor, because of matching with control circuit, we will check the control circuit. At the same time, we would like you to evaluate it carefully, too.

⚠ • You should not hold the lead wire at the time of handling because the lead wire might be broken. Please hold the flame when you use it.

• The semiconductor in motor circuit might be damaged due to the charged and/or leakage. You should take the countermeasure against static electricity (+/-200 V or less) in your process.

3. STORAGE

・It is generally required that a storage period of fans without any use be limited to six (6) months maximum. Storage of fans in high temperature and or high humidity environment should be avoided.

4. SPECIAL USAGE

This usage requires a specially high level of quality and reliability of the products, which are neither intended nor guaranteed to be used for any equipment whose failure or malfunction would cause damage to the human life or body or any other serious damage (e.g. nuclear power control devices, aerospace instrument, transportation machines (e. g. cars, trains and ships), traffic signals, fuel controllers, medical equipment and various safety devices). Please contact our sales personnel for any unintended usage of the products.

7. SPECIAL ITEMS

7-1 WARRANTY

Our warranty is limited to the replacement of failed fan at free of charge, if and only if the failure is found within two years after it was shipped out from our production facility and if the cause of the failure is proven to be attributable to the supplier.
Our liability does not extend to the consequential damages caused by the failed fan.

7-2 NOTE

Please consider having an independent protection system in the customer's instruments in the event that the fan should stop operating.
After the expiration of the life of our products or your company's products, please comply with the relevant laws and regulations of the country where the products are to be re-used or disposal.

7-3 POWER SOURCE

Brushless DC fans are designed to be used at DC power source with bypass capacitor. We would recommend you to use DC power source which is filtered ripple and noise.

- Fans are designed to perform as expected when stable voltage is supplied.
- Fluctuation of the voltage between Vcc(+) and GND while the fan is powered must be within the specified operating voltage range.
- Fluctuation cycle of the voltage between Vcc(+) and GND while the fan is powered must be longer than the fan's rotation cycle.
- GND of the fan must be kept below the voltage of its Vcc(+) when the voltage is switched ON/OFF or the fan is not running.
- Devices that use the fans are supposed to be designed so that the voltage applied on the revolution signal is not affected by power ON/OFF.

7-4 ENVIRONMENT-RELATED SUBSTANCES

Based on RoHS3, cadmium, lead, mercury and compound of these substances and hexavalent chromium compound, Polybromo bi-phenyl(PBB) and polybromo di-phenyl ether(PBDE) are not included in this product.

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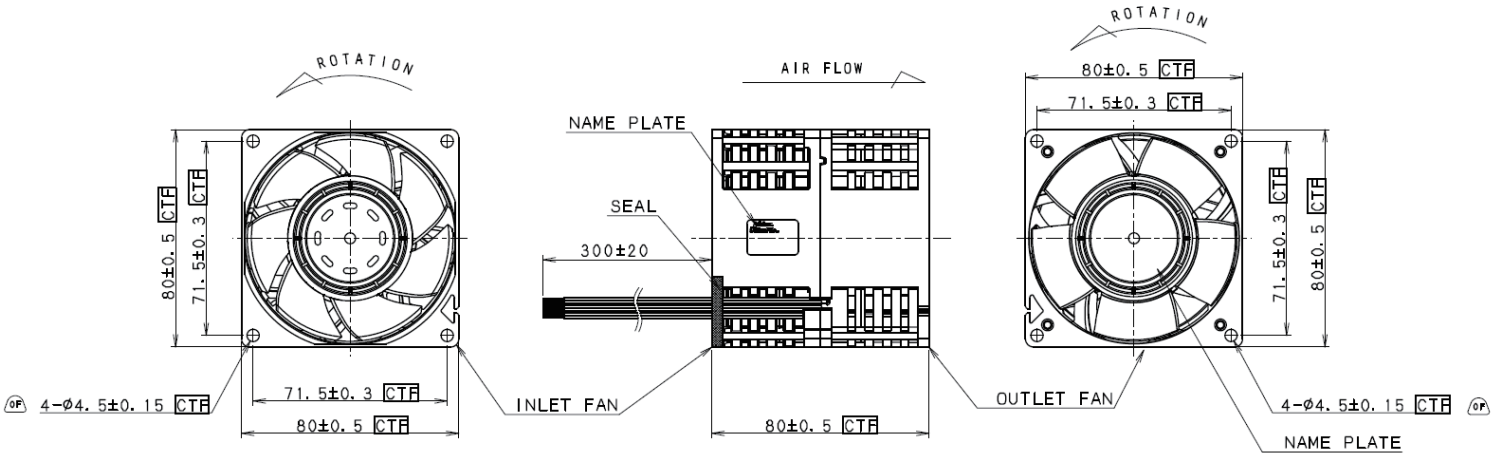
■ OUTLINE DIMENSIONS

(Unit:mm)



Color	Lead wire		Function	
Red	UL3265	AWG 24	Inlet	+V
Black				GND
Blue				PWM
Yellow				SIG
Orange			Outlet	+V
Gray				GND
Green				PWM
White				SIG