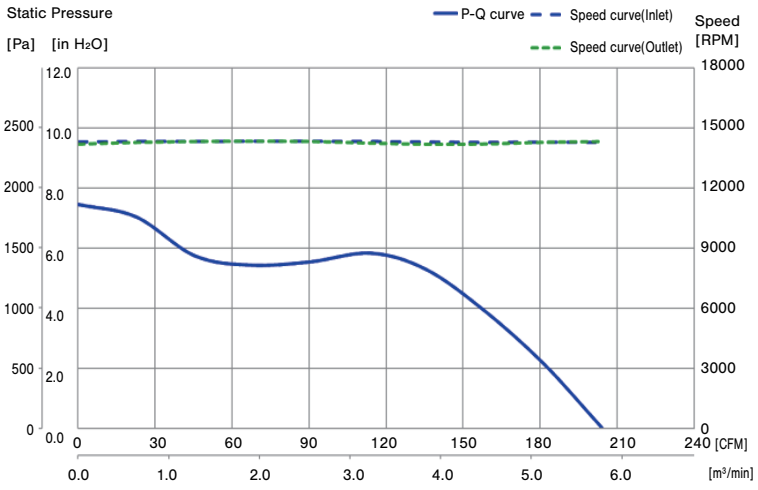
DC BRUSHLESS AXIAL FAN

C80H12BS4ME-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 12 VDC Brushless Fan
- High Airflow (203.00 CFM @ 5.75 m^3 /min)
- Low Current Consumption 14.30 A (Nominal) 15.73 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 (UL94 V-0)
	Impeller material	PBT (UL94 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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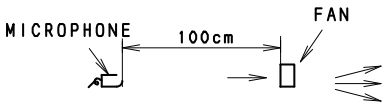
2. ELECTRICAL SPECIFICATIONS

No	Item / Part number	C80H12BS4ME-07	Remarks
2-1	Rated voltage	12 VDC	
2-2	Operating range	10.8~13.2 V	(Note 5)
2-3	Current consumption	Max.15.73 A 14. 30 A (Nominal)	In free air at rated voltage (Note 4) (Note 6)
2-4	Power consumption	Max.188.76 W 171.6 W (Nominal)	In free air at rated voltage
2-5	Rated speed	Min. 12960 min^{-1} 14400 min^{-1} (Nominal) Max. 15840 min^{-1}	In free air at rated voltage Intake side (Note 4)
2-6	Maximum air flow	Min. 4.91 m^3 /min (173.3 CFM) 5.75 m^3 /min (203.0 CFM)	At rated voltage At zero static pressure (Note 4)
2-7	Maximum static pressure	Min.1504 Pa (6.04 inch-H_2O) 1955 Pa (7.85 inch-H_2O)	At rated voltage At zero air flow (Note 4)
2-8	Acoustic noise	Max. 83.5 dB (A) 80.5 dB(A) (Nominal)	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: 10.8 V~13.2 V operating voltage range is for continuous DC voltage. Power supply voltage ripple 5% maximum.
- Note 6: The max value of current consumption does not represent the peak value.

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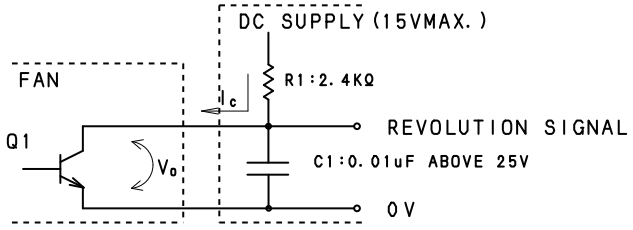
3. PROVISION OF REVOLUTION SIGNAL

3-1 OUTPUT OF REVOLUTION SIGNAL

● Output type: open collector type
● Electrical specification

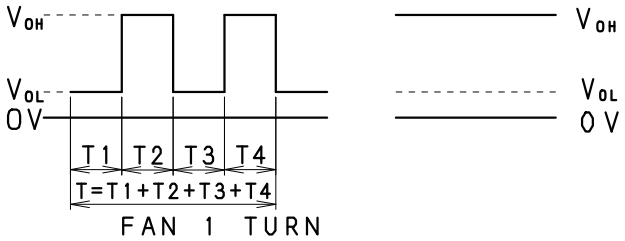


Remark: As for measuring V_{OL}, it is necessary to put cr low pass filter which is constructed of R1 and C1. The time constant of R1 x C1 is to be more than 24us such as R1=2.4 kΩ C1=0.01 uF.

● Absolute maximum specification
Collector current I_C=10 mA Max.
Release Voltage V_{OH} = 15 V Max.

● Electrical characteristics
Saturation Voltage V_{OL} = 0.8 V Max.
At I_C=5 mA

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

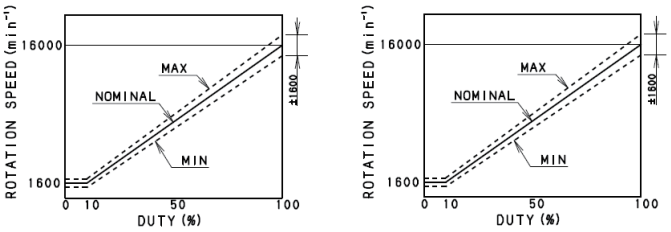


Remark: At locked position, output becomes V_{OH} OR V_{OL}.
$T=T_1+T_2+T_3+T_4=60/N$ (Sec)
N: Calculated Fan Speed (min^{-1})
$N=n \times A$
n: Fan Speed (min^{-1})
A: Fake Revolution Signal Factor ※ See Table A
$DUTY = T_1 / T_1+T_2 = 50\pm10\%$

Table A : Fake Revolution Signal Factor

Duty cycle (Positive)(%)	Factor
	Inlet & Outlet side
0	1.11
10	1.11
20	1.11
50	1.11
70	1.11
90	1.11
100	1.11

3-2 CALCULATED FAN SPEED VS PWM CONTROL SIGNAL AT RATED VOLTAGE



Duty cycle (Positive)(%)	Speed (min^{-1})
	Inlet&Outlet side
0 —10	1600±300
20	3200±320
50	8000±800
70	11200±1120
90	14400±1440
100	16000±1600

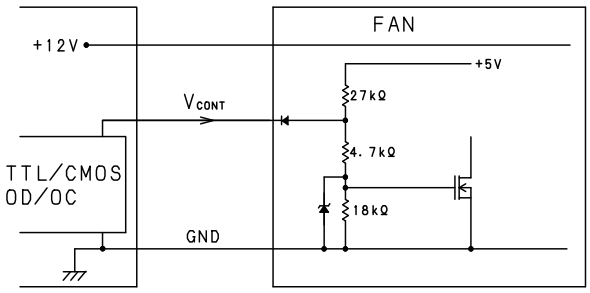
3-3 ⚠ CAUTION

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.

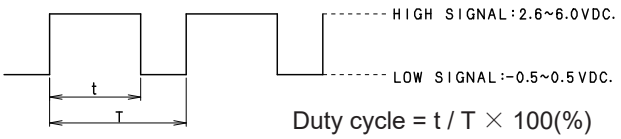


*Actual machine side is TTL/CMOS PWM controlled.

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 30 kHz.

4-2 PWM CONTROL SIGNAL

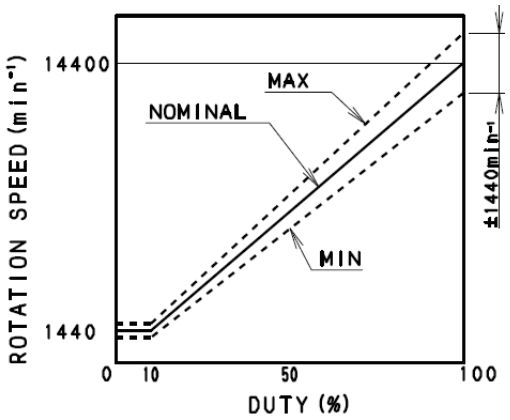
Signal voltage range: 0~6.0 VDC



Duty cycle = t / T × 100(%)

The frequency for control signal of the fan shall be able to accept at 20 kHz-30 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.

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	1440±300
10	1440±300
20	2880±500
50	7200±720
70	10080±1008
90	12960±1296
100	14400±1440

※ Tolerance of 5000 min^{-1} or less is ±500 min^{-1}

Note: The standards should be the specified value at normal temperature (21~25°C) and normal humidity (60~65%) and free air unless otherwise notice.

5. SPECIAL TEST

5-1 VIBRATION TEST

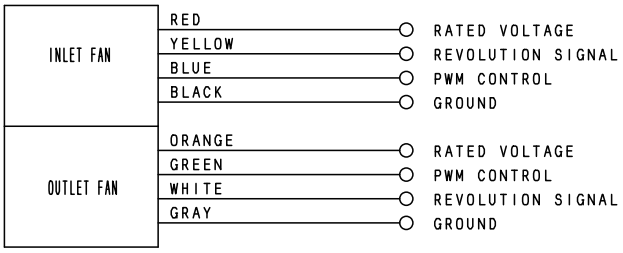
Standards for items 2-3~2-8 and 6-2 should be met after 30 minutes 0.2 mm amplitude, 55 Hz vibration in each direction: up-down, right-left, forward-back, in non-operating condition.

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 30cm 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

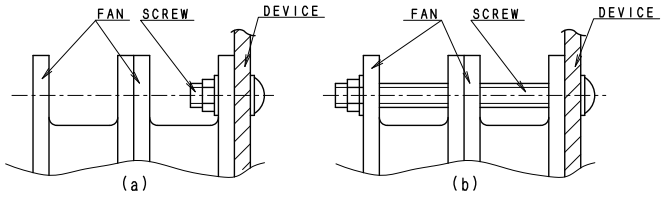


6-2 LOCKED ROTOR

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

6-3 ⚠ CAUTIONS IN INSTALLATION OF FAN MOTORS

Please consider system layout not to place any obstacles within 3mm from the fan housing edge of inlet side(Impeller side).
In case of screwing the fan housing, flatness of installation surface should be max.0.1, otherwise the housing may transform and interfere with the impeller.
The fan should not get any impact or vibration during rotation. When vibration or impact is applied to the fan during rotation, The fan may break by interfering with obstacle in the system.
Please fix the fan in the system so that it will not rattle. Vibration of the fan may cause contact between the fan and the system, which will generate noise.
Please do not place any obstacle near outlet and inlet side of the fan.
Placing obstacles near the fan may deteriorate air flow. It may cause cooling performance reduction as well as fan motor life deterioration due to heavy load on the bearings.
This model is designed to be installed as the screw in flange one side(Refer to figure((a)). In case of installations as the screw through both flanges (Refer to figure ((b)). It may cause damages on the housing and/or interference between the impeller and the housing because of the housing deform.
For any usage that does not meet above conditions, please evaluate at user's side or consult with us.



6-4 ⚠ USAGE OF FAN MOTOR

Please do not put resistors or other electronic components on the extension of the fan motor lead wires for the purpose of fan motor speed reduction.
It may make the voltage to the fan fluctuate and become lower than lower limit of operating voltage range.
In this case, there may be such failures like no start or unstable rotation of fan motor.

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.

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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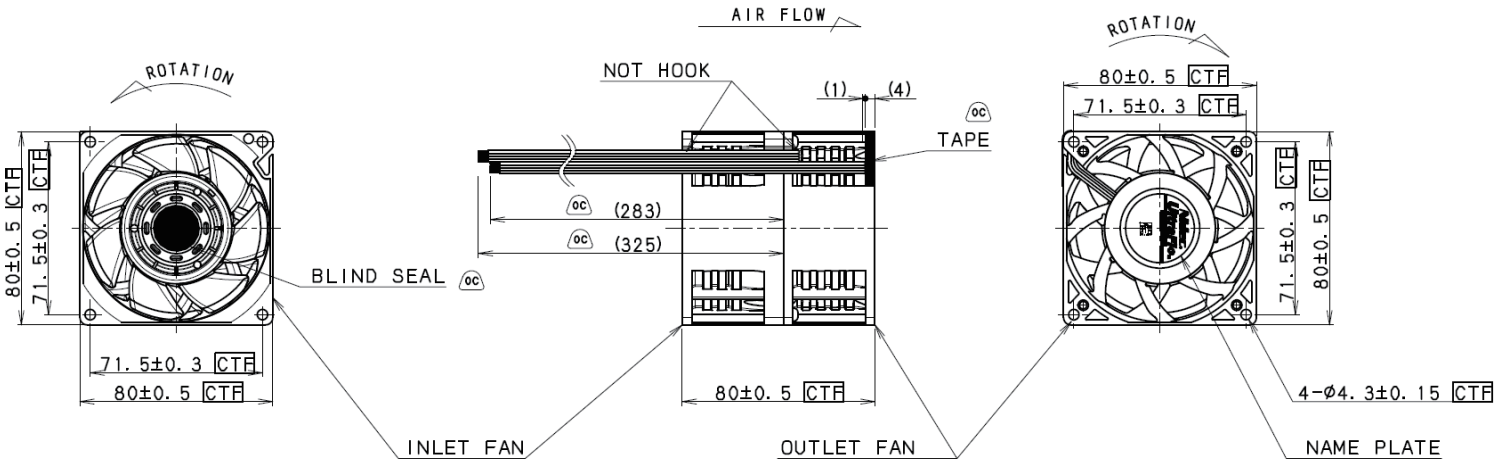
■ OUTLINE DIMENSIONS

(Unit:mm)



Color	Function	Lead wire	
Red	Inlet +12V	UL3265, AWG 20 or AWG 18	OC
Black	Inlet GND	UL3265, AWG 20 or AWG 18	OC
Blue	Inlet PWM	UL3265, AWG 24	
Yellow	Inlet FG	UL3265, AWG 24	
Orange	Outlet +12V	UL3265, AWG 20 or AWG 18	OC
Gray	Outlet GND	UL3265, AWG 20 or AWG 18	OC
Green	Outlet PWM	UL3265, AWG 24	
White	Outlet FG	UL3265, AWG 24	

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