# NMB

## PWM 06025DA-12R (60 X 25)

*Pulse Width Modulation Axial Cooling Fan*

DC Axial Fans

## General Specifications

Motor Type:  DC Brushless Motor

Motor Protection:  Auto Restart/Polarity Protection

Motor withstands reverse connection for positive and negative leads.

Insulation Resistance:

10M Ω or over with a DC500V Megger

Dielectric Withstand Voltage:
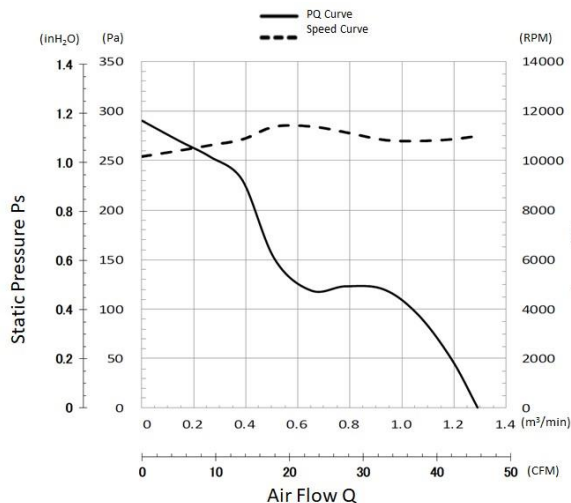
AC 700V 1s or 500V 1min

Allowable Ambient Temperature Range:

-10°C ~ +70°C (Operating)
-40°C ~ +70°C (Storage)
(non-condensing environment)

## Characteristics Curves



## PWM Benefits & Applications

PWM Benefits
- Increased Life Expectancy
- Energy Saving
- Lower Vibration
- Lower Noise
- Current Spike Prevention

PWM Applications
- Routers
- Switches
- Storage
- Data Centers
- Optical Repeaters
- Broadcast Equipment
- Inverters
- UPS
- Battery Chargers
- Fuel Cells
- Industrial Power Supplies
- Welders
- Plasma Cutters
- Instrumentation
- Test Equipment
- Enclosures and more

- Customized fan performances at multiple operating points.
- Peak efficiency resulting in lower total ownership costs.
- Cost effective and better reliability.

## Life Expectancy L10
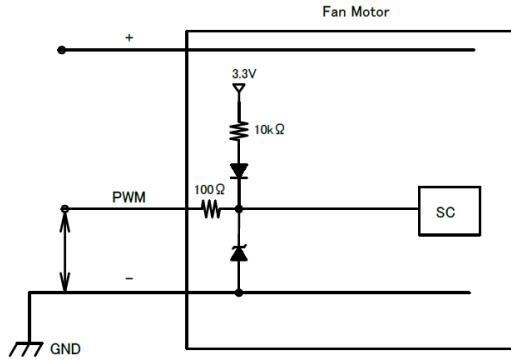
60°C    40,000 Hours

## Specifications

| MODEL | Rated Voltage | Operating Voltage | Current | | InputPower | | Speed | Max. Air Flow | | Max. Static Pressure | | Noise | Mass |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Avg | Max | Avg | Max | | | | | | | |
| | (V) | (V) | (A)[*1] | (A)[*1] | (W)[*1] | (W)[*1] | (min⁻¹)[*1] | (CFM)[*1] | (m³/min)[*1] | (inH₂O)[*1] | (Pa)[*1] | (dB)[*1] | (g) |
| 06025DA-12R-AU-02 | 12 | 7.0 ~ 13.2 | 0.67 | 0.87 | 8.04 | 10.44 | 11000 | 45.6 | 1.29 | 1.17 | 290 | 52.0 | 95 |

*1: Maximum Values in Free Air

**MinebeaMitsumi**
*Passion to Create Value through Difference*

## PWM Specifications

### PWM Control

● Connection



Fan Motor

3.3V
10kΩ
100Ω
PWM
SC
GND

1. PWM Control

| | | | |
|---|---|---|---|
| $V_{st}$ = Low Level (0V~0.4V) | → | Stop | (On Duty 0%) |
| $V_{st}$ = High Level (4.5V~5.0V) | → | Full Speed | (On Duty 100%) |
| $V_{st}$ = Open | → | Full Speed | |

2. PWM Duty & PWM Input Pulse



$V_{st}$ [V]

$V_{st}$ = High Level

$V_{st}$ = Low Level

t

T

Time[s]

PWM Duty means that a ration of high level time (t)/PWM Input Pulse(T).

(t/T) × 100 : On Duty 0% ~ 100%

**PWM Frequency f = 25[kHz]**
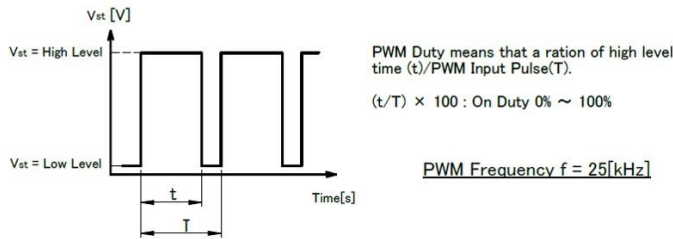
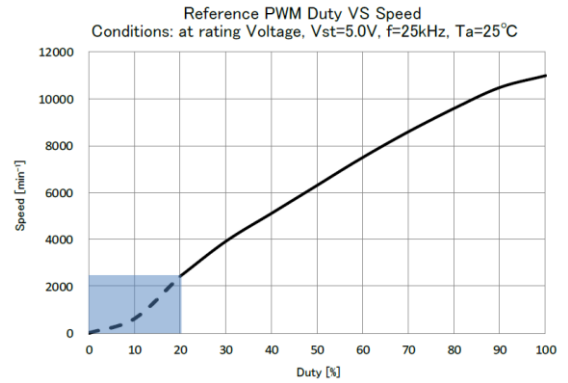## TACHO Specifications

TACHO SIGNAL
1. OUTPUT CIRCUIT : OPEN DRAIN
2. SPECIFICATION
   Ta=25℃
   Absolute Maximum Ratings at Ta=25℃
   $V_{DS}$ max : +15V
   $I_D$ max : 5mA [$V_{DS}$(sat)max = 1.0V]



DC FAN INSIDE

$I_D$

R

$V_{DS}$

TACHO SIGNAL OUTPUT

TACHO SIGNAL CIRCUIT

## PWM Characteristics Curve



Reference PWM Duty VS Speed
Conditions: at rating Voltage, Vst=5.0V, f=25kHz, Ta=25℃
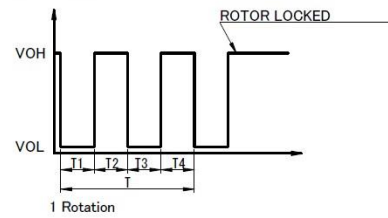
Speed [min⁻¹] vs Duty [%]
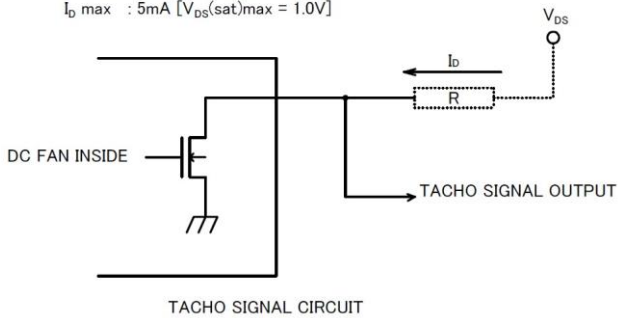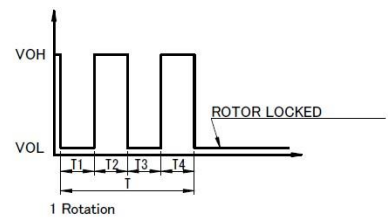
3. The condition for PWM control are as follows.

· When you use this under PWM control, always be sure the motor's operation under practical mounting state.
  Fan motor may not start up caused by PWM control at very low speed condition.

· To run at Rating Voltage.

· Please use the start with Duty 20% or more at 25kHz.
  [At rated voltage input, Ambient temperature 25℃]

3. OUTPUT WAVEFORM) : AT RATED VOLTAGE
   OUTPUT SIGNAL VOLTAGE
   3-1 Case-1



VOH

VOL

ROTOR LOCKED

T1 T2 T3 T4

T

1 Rotation

3-2 Case-2



VOH

VOL

ROTOR LOCKED

T1 T2 T3 T4

T

1 Rotation

1) When the rotor is locked at VOH position of signal, signal keeps VOH position.
2) When the rotor is locked at VOL position of signal, signal keeps VOL position.
3) T=T1+T2+T3+T4=60/m=1 rotation

m : min⁻¹

Tach Duty Cycle＝50%±10%