Low Power Consumption Fan “San Ace 80” GA Type

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1. Introduction

In the development and spread of information processing and communication technologies in recent years, requirements of high performance and space saving on IT equipment and communication equipment are growing steadily. However, these requirements will increase the power consumption of the equipment or make the anti-heat measure more difficult, so being low in power consumption is also required lately.

Reduction of environment load is being requested due to the Earth environment problems such as global warming, where the increase of carbon dioxide emission by burning the fossil fuel to generate electrical power is becoming an issue, so reduction of power consumption is requested from the environment point of view too.

With the request of reduction of power consumption from both the operational point and environmental point, reduction of power consumption for the cooling fan has also become a fundamental requirement.

This document introduces the advantages and characteristics of the low power consumption “San Ace 80” GA type fan that was developed from these situation.

2. Background of the Development

We have previously developed the 80 mm square, 38 mm thick DC cooling fan “San Ace 80” GV type. When it firstly went on market, this model had the highest air flow in the industry for the same-sized models, but as noted previously, the current market demands lower power consumption in addition to the functional requirements such as high air flow.

This fan retains compatibility with the conventional model, including size and mounting holes, and it realizes the lowest power consumption in the industry.

Fig. 1: “San Ace 80” GA type

3. Product Advantage

Fig. 1 shows the appearance of the “San Ace 80” GA type fan.

The advantages of this new model are as follows:

(1) Low power consumption
(2) Low SPL
(3) PWM speed control function

The impeller, frame, and circuit were newly developed and the motor was optimized for the “San Ace 80” GA type (here in after called new model) in order to achieve low power consumption and low SPL.

4. Product Overview

4.1 Dimensions

Fig. 2 shows the dimensions of the new model. The new model has the same mounting dimensions as the conventional model, making it compatible.

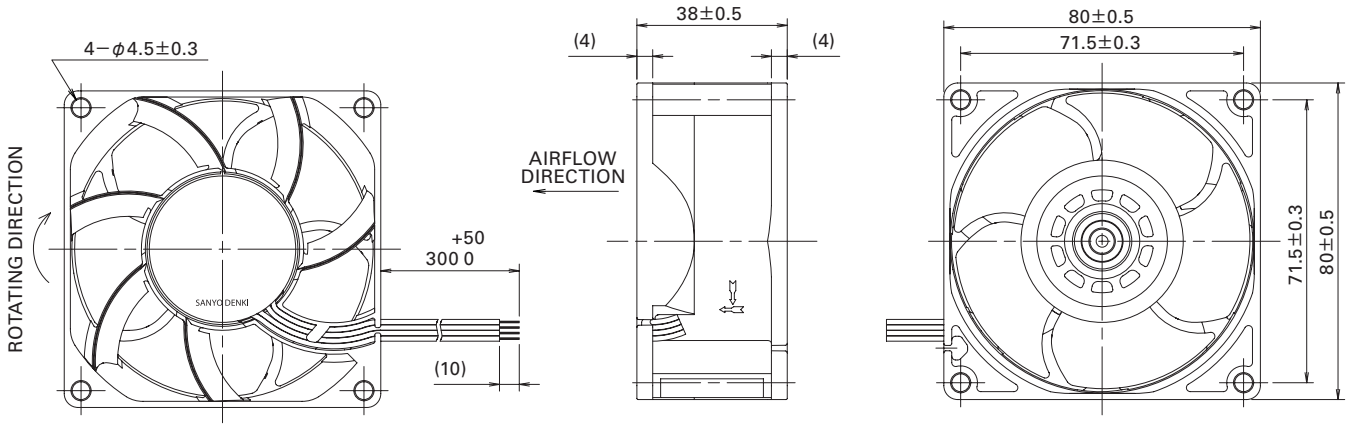

Fig. 2: "San Ace 80" GA type dimensions, ribbed frame (unit: mm)

Table 1: "San Ace 80" GA type general characteristics

Model No.	Rated voltage [V]	Operating voltage [V]	PWM duty cycle [%]	Rated current [A]	Rated input [W]	Rated speed [min^{-1}]	Max. air flow		Max. static pressure		Sound pressure level [dB(A)]
							[m^3/min]	[CFM]	[Pa]	[inchH_2O]	
9GA0812P1S61 (9GA0812P1S611)	12	10.8～13.2	100	0.94	11.28	9550	2.6	91.8	480	1.93	59
			0	0.1	1.2	2900	0.74	26.1	60	0.24	27
9GA0812P1H61 (9GA0812P1H611)			100	0.6	7.2	8250	2.25	79.4	380	1.53	55
			0	0.08	0.96	2500	0.64	22.6	45	0.18	24
9GA0824P1S61 (9GA0824P1S611)	24	20.4～27.6	100	0.47	11.28	9550	2.6	91.8	480	1.93	59
			0	0.06	1.44	2900	0.74	26.1	60	0.24	27
9GA0824P1H61 (9GA0824P1H611)			100	0.3	7.2	8250	2.25	79.4	380	1.53	55
			0	0.05	1.2	2500	0.64	22.6	45	0.18	24

Ribless model is in ( )　　* Input PWM frequency: 25 kHz

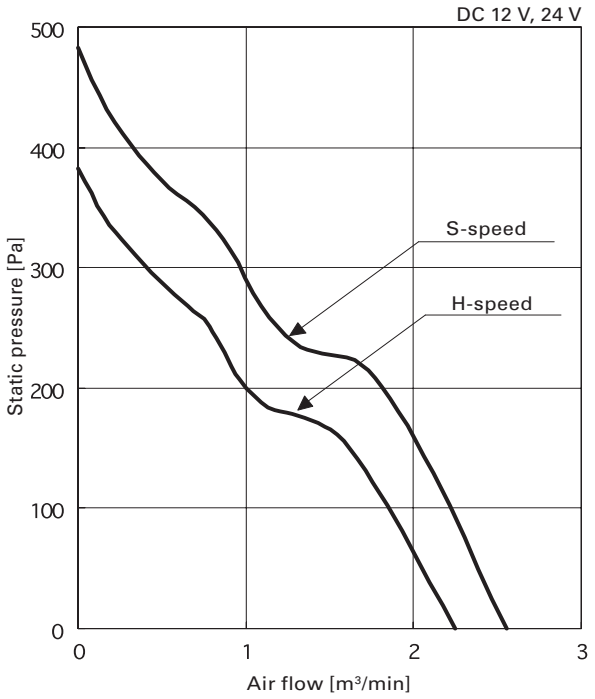

Fig. 3: Example of air flow vs. static pressure characteristics

4.2 Characteristics

4.2.1 General characteristics

Table 1 shows the general characteristics for the new model. There are two types of rated voltage, DC 12 V and DC 24 V, and each type of rated voltage is available in two types of rated speed: H-speed (8,250 min^{-1}) and S-speed (9,550 min^{-1}).

4.2.2 Air flow vs. static pressure characteristics

Fig. 3 shows the air flow versus static pressure characteristics of the new model.

4.2.3 PWM control function

The new model has a PWM control function that controls the fan speed from an external source.

If the fan is not always operated at full speed, and the speed is controlled depending on the state of the heat generation, the power consumption and SPL can be reduced for the entire equipment. Therefore, the demand has drastically increased for fans with a PWM control function.

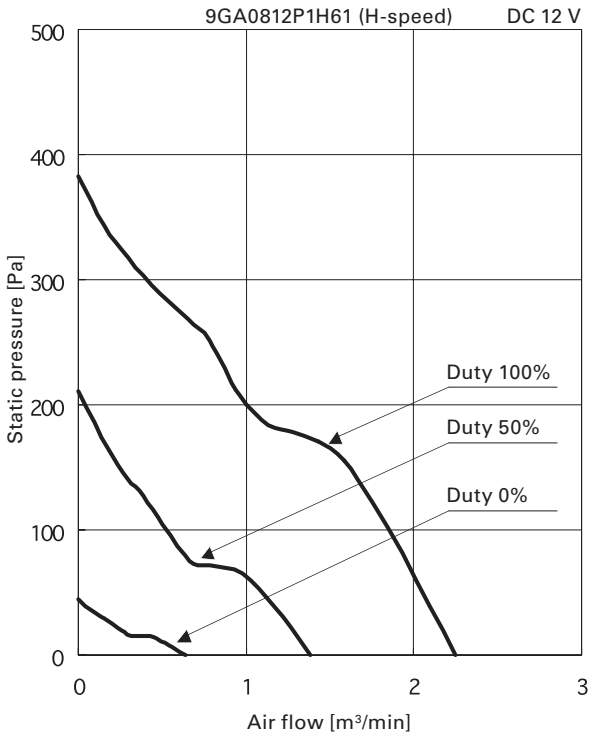

Fig. 4: Air flow vs. static pressure characteristics at individual PWM duty

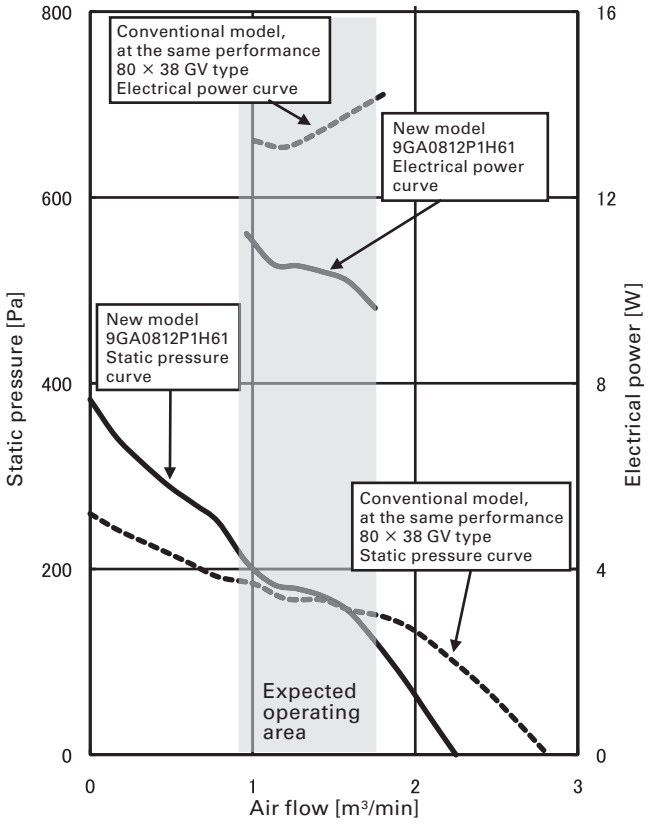

Fig. 5: Comparison of electrical characteristics

Fig. 4 shows the air flow versus static pressure for PWM duty of the new model.

4.3 Life expectancy

The new model has a life expectancy (survival rate of 90% with continuous operation at the rated voltage under free air conditions and at normal humidity) of 40,000 hours at 60°C ambient temperature.

5. Comparisons with Conventional Models

The new model has a new design for the impeller and frame, and optimization was performed for the motor in order to achieve low power consumption and low SPL.

Following are the detailed differences between the new model and conventional “San Ace 80” GV type.

5.1 Comparison of power consumption

Fig. 5 shows the electrical characteristics comparison of the 80 × 38 GV type new model (9GA0812P1H61) and conventional model (9GV0812P1F03) when cooling performance will be equal within expected operating area adjusting speed.

As shown in Fig. 6, power consumption is reduced by approximately 51% at free air compared to the conventional model, and as shown in Fig. 7, it has reduced by approximately 20% in expected operating area. By this mean, the power loss of the equipment can be reduced while maintaining the cooling performance.

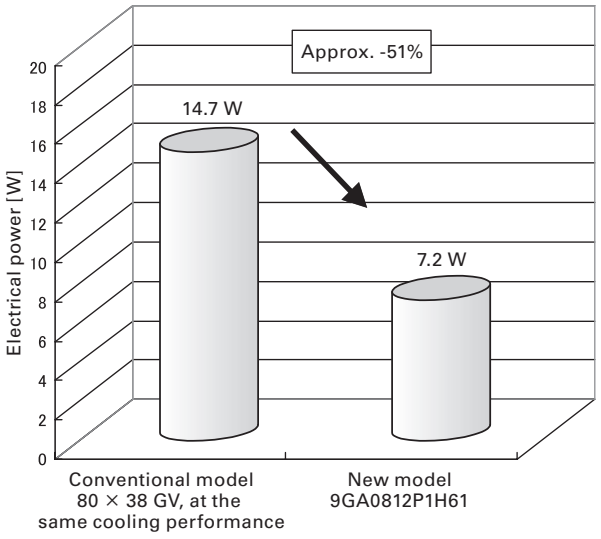

Fig. 6: Comparison of electrical power at free air

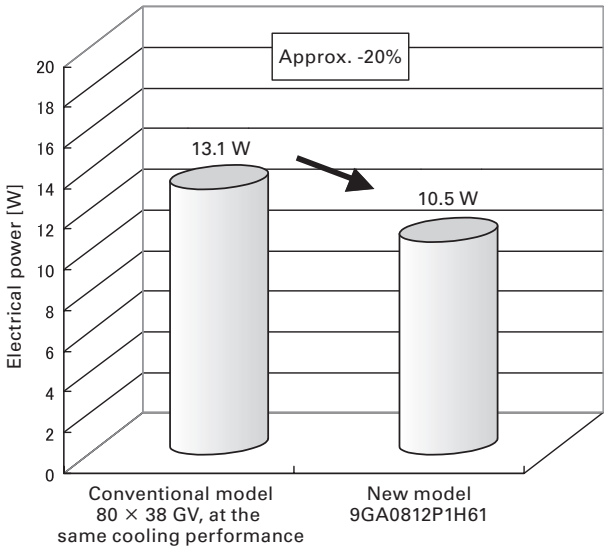

Fig. 7: Comparison of electrical power at expected operating area

5.2 Comparison of sound pressure level

Just as described in previous section, Fig. 8 shows a comparison of sound pressure level when the conventional model running at the same cooling performance as the new model. There is a reduction of approximately 2 dB (A) at free air.

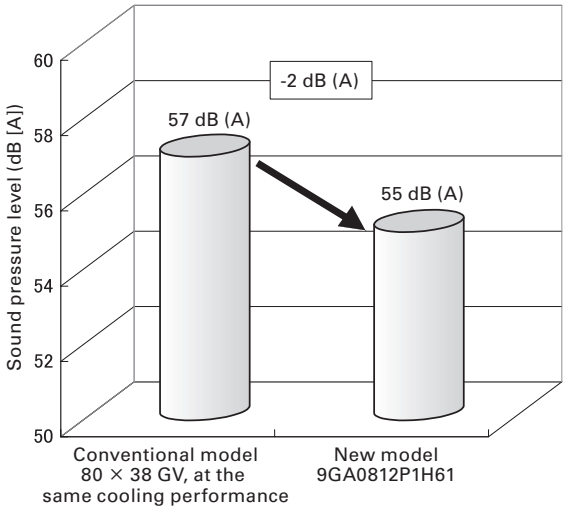

Fig. 8: Comparison of sound pressure level at free air

6. Conclusion

This document introduced some of the advantages and characteristics of the newly developed low power consumption “San Ace 80” GA type fan.

With the new design on the impeller and frame, and optimization of the motor, the new model achieves significant improvements in the power consumption compared to conventional models. Also, the sound pressure level was reduced at the same cooling performance.

In the future, there is likely to be even more increased demand for low power consumption for information systems such as servers, storage, and telecommunication equipment, not only for measures against power consumption or heat, but from the environmental point of view, making reduced power consumption for fans essential. As a cooling fan, the new model can greatly contribute to the issue for low power consumption equipment.

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