

Low Power Consumption Fan “San Ace 60” GA Type

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1. Introduction

With the development and spread of information processing and communication technologies in recent years, requirements of high performance and space saving on information equipment and communication equipment are growing steadily. However, these requirements tend to increase the power consumption of the equipment. On the other hand, low power consumption is required in equipment lately to take measure on the environmental problems.

With these backgrounds, reduction of power consumption while maintaining the equal cooling performance with the conventional models has become a fundamental requirement for the cooling fans used in the information and communication equipment.

This document introduces the advantages and characteristics of the low power consumption 60 mm square, 38 mm thick fan “San Ace 60” GA type fan that was developed in order to meet these market needs.

2. Background of the Development

We have previously developed the 60 mm square, 38 mm thick DC cooling fan “San Ace 60” GV type. When it firstly went on market, this model had the highest air flow in the industry for the same-sized models. But in the recent years, needs of the market has shifted to the requirement of lower power consumption with equal cooling performance in the actual operating area where the fan is used.

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



Fig. 1: “San Ace 60” GA type

3. Product Advantage

Fig. 1 shows the appearance of the “San Ace 60” GA type. The advantages of this new model are as follows:

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

The impeller and frame were newly developed for the “San Ace 60” 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.

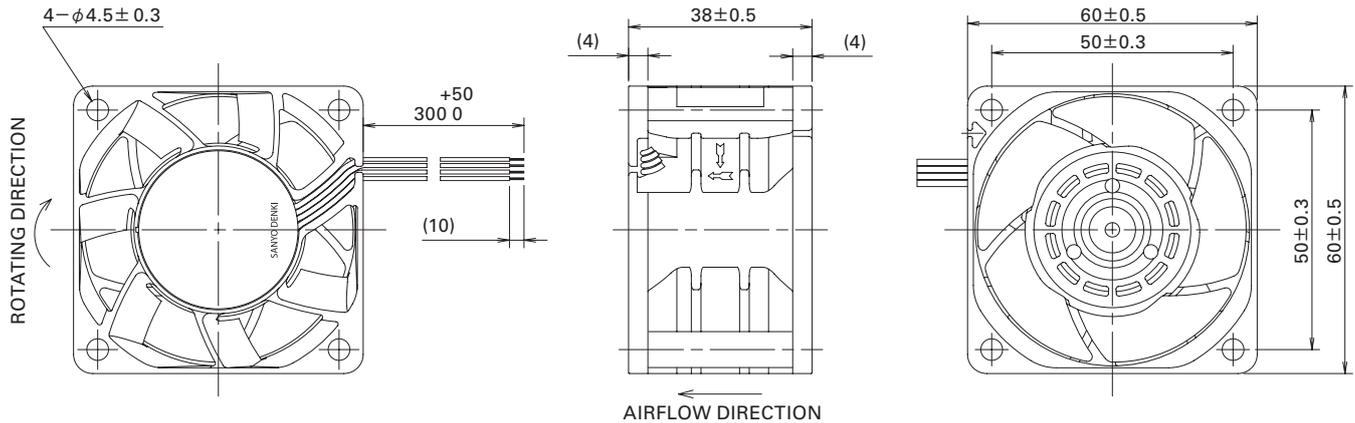


Fig. 2: "San Ace 60" GA type dimensions (unit: mm)

Table 1: "San Ace 60" 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 [m ³ /min] [CFM]		Max. static pressure [Pa] [inchH ₂ O]		Sound pressure level [dB(A)]	Operating temperature [°C]	Life expectancy [h]
9GA0612P1J03	12	10.8 ~ 12.6	100	1.50	18.00	17,500	1.75	62	820	3.3	63	-10 ~ +60	30,000
			20	0.10	1.20	4,000	0.40	14	43	0.17	24		
10.8 ~ 13.2		100	0.95	11.40	14,800	1.50	53	600	2.4	59	-10 ~ +70	40,000	
		20	0.10	1.20	4,000	0.40	14	43	0.17	24			
		100	0.55	6.60	11,500	1.15	40	375	1.5	52			
		20	0.06	0.72	2,600	0.27	9.5	20	0.08	19			
9GA0612P1K60	100	0.95	11.40	14,800	1.50	53	675	2.7	59	-10 ~ +60			
	0	0.05	0.60	1,480	0.134	4.7	8.3	0.03	16				

* Input PWM frequency: 25 kHz

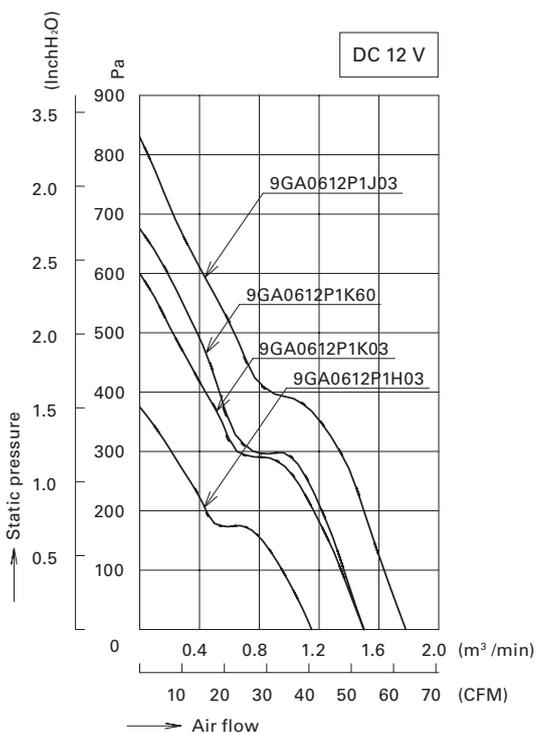


Fig. 3: Example of air flow vs. static pressure characteristics

4.2 Characteristics

4.2.1 General characteristics

There are 4 types of product, J-speed (17,500 min⁻¹), K-speed (14,800 min⁻¹), H-speed (11,500 min⁻¹), and K-speed with feedback control function to stabilize the speed.

Table 1 shows the general characteristics for the new model.

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.

Demand for the fans with a PWM control function has drastically increased recently since the power consumption and SPL can be further reduced for the entire device by controlling the speed depending on the state of the heat generation in equipment instead of operating the fan at full speed constantly.

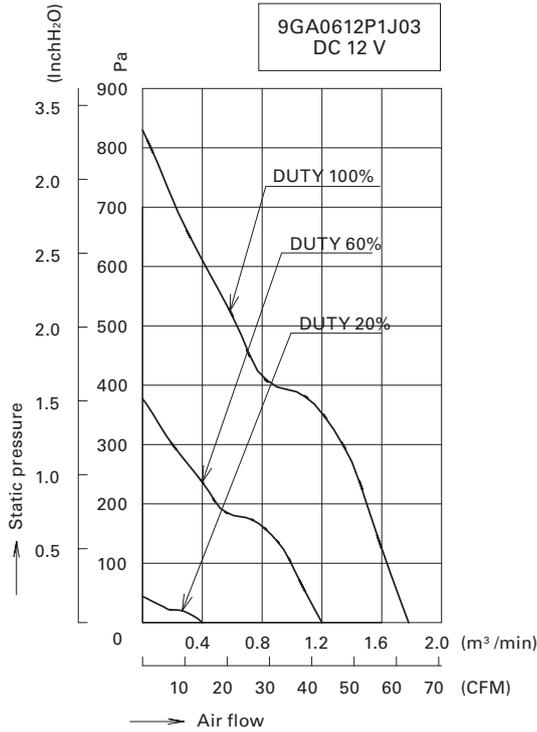


Fig. 4: Air flow vs. static pressure characteristics at individual PWM duty

Fig. 4 shows the air flow versus static pressure characteristics at individual PWM duty regarding 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 30,000 hours for the J-speed (17,500 min⁻¹) only and 40,000 hours for other 3 models 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 compared with the conventional model in the expected operating area.

The following introduces the specific differences between the new model "San Ace 60" GA type and the conventional model "San Ace 60" GV type.

5.1 Comparison of power consumption

Fig. 5 shows the electrical power characteristics comparison of the new model (9GA0612P1K60) and conventional model 60 mm square, 38 mm thick GV type

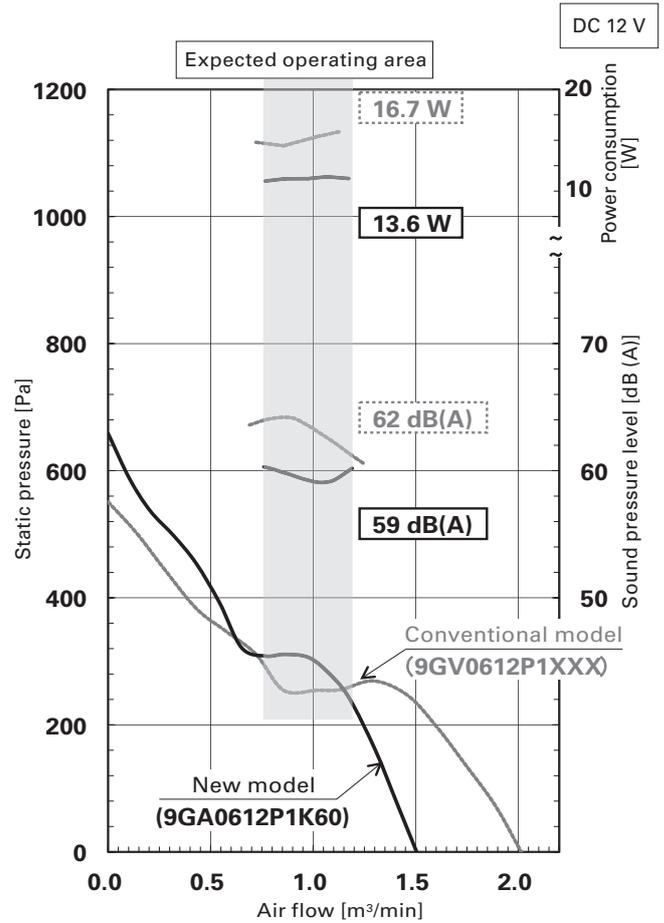


Fig. 5: Comparison of air flow vs. static pressure vs. sound pressure vs. power consumption

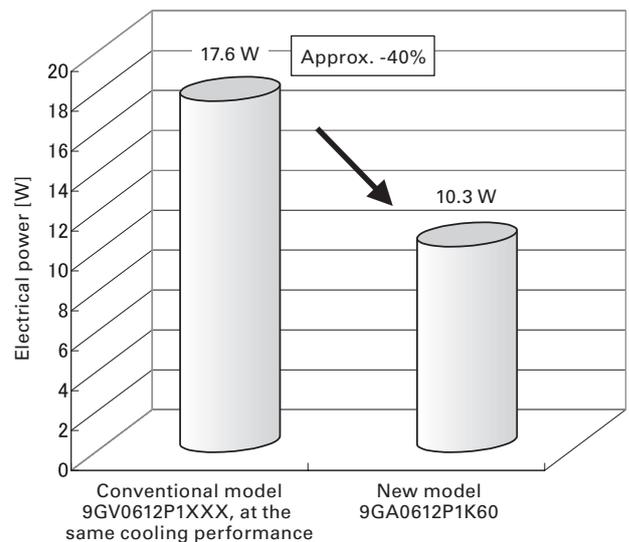


Fig. 6: Comparison of electrical power at free air

(9GV0612P1XXX) when the cooling performance will be equal within the expected operating area by adjusting speed.

As shown in Fig. 6, power consumption is reduced by approximately 41% at free air compared to conventional

model, and as shown in Fig. 7, it has reduced by approximately 15% in expected operating area. By this mean, the power loss of the equipment can be reduced keeping the cooling performance.

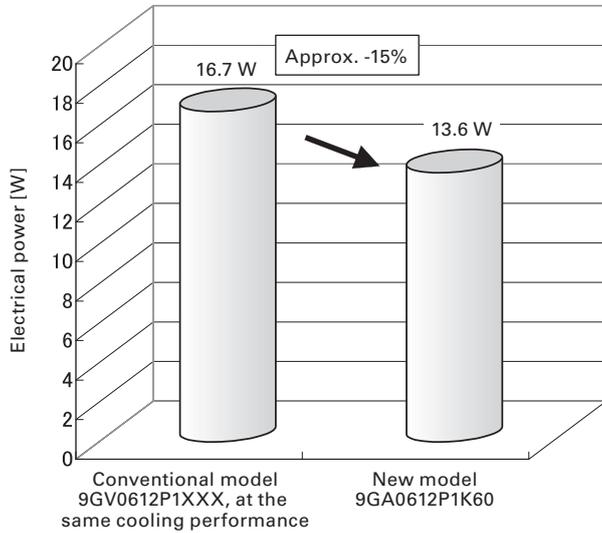


Fig. 7: Comparison of electrical power at expected operating area

5.2 Comparison of sound pressure level

Just as described in the previous section, Fig. 5 and Fig. 8 show comparisons of the sound pressure levels when the conventional model is running at the same cooling performance as the new model. Approximately 3 dB (A) with expected operating area is reduced.

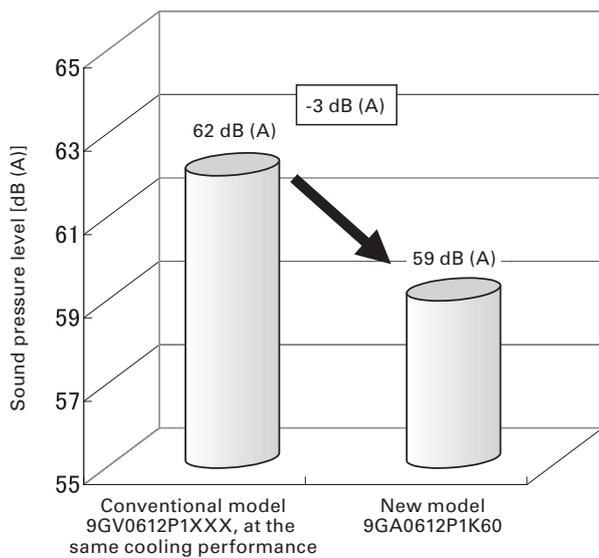


Fig. 8: Comparison of sound pressure level at expected operating area

6. Conclusion

This document introduced some of the advantages and characteristics of the newly developed low power consumption "San Ace 60" GA type fan.

With the new design on the impeller, frame, and motor, the new model achieves significant reduction of the power consumption and SPL compared to conventional models keeping same cooling performance at expected operating area. Also, this model has the top performance in the industry for 60 mm square, 38 mm thick fans.

We believe that the new product will contribute greatly to the ever accelerating requirement for energy conservation of the electronic and communication equipment.



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