Large Air Volume and High Static Pressure Fan “San Ace 172” GV Type

Takahisa Toda Masato Murata Jirou Watanabe

1. Introduction

Currently, the server and communications equipment markets are seeing great and continuing increases in both packaging density and heat generation. Among these, there seems to be strong demand for the well received 172 mm diameter × 51 mm thick (side cut) fan with higher static pressure and air volume relative to its rotation speed.

We therefore developed a 172 mm diameter × 51 mm thick (side cut) fan with low noise and the highest static pressure in the industry.

This document introduces the functions and features of the large air volume and high static pressure “San Ace 172” GV type fan that we have developed.

2. Development Background

Sanyo Denki has a history of developing and selling 172 mm diameter × 51 mm thick fans with the best cooling performance in the industry. However, as was mentioned before, market demand for increased static pressure has grown stronger recently and current products cannot meet this demand.

In response to the state of the market, we developed the “San Ace 172” GV type series of large air volume and high static pressure 172 mm diameter × 51 mm thick fans.

3. Product Features

Figure 1 shows an exterior view of the “San Ace 172” GV type fan.

The features of this product are as follows.

(1) Large air volume and high static pressure

(2) Low power consumption

(3) Low noise

The “San Ace 172” GV type fan uses a new design for both frame and blades to achieve increased air flow, increased static pressure, and lower power consumption.

Figure 1 Exterior view of the “San Ace 172” GV type fan

4. Product Overview

4.1 Dimensions

The new product has the same dimensions as the current product and thus maintains compatibility.

Figure 2 shows the dimensions of the unit.

4.2 Characteristics

4.2.1 General characteristics

The rated voltage is either 24 V or 48 V, and the rated rotating speed is 6300 min-1. The general characteristics of the “San Ace 172” GV type fan are shown in table 1.

4.2.2 Air volume vs. static pressure characteristics

The air volume versus static pressure characteristics are shown in figure 3.

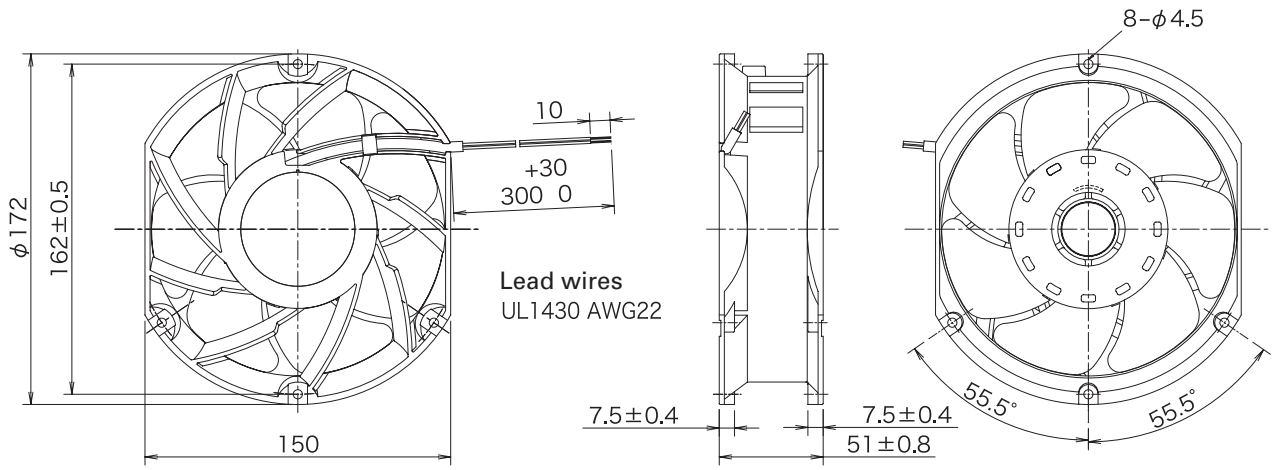

Figure 2 Dimensions of the "San Ace 172" GV type fan

Table 1 Characteristics of the "San Ace 172" GV type fan

Model No.	Rated Voltage	Operating Voltage Range	Rated Current	Rated Input	Rated Rotating Speed	Maximum Air Volume		Maximum Static Pressure	Sound Pressure Level	Mass
	(V)	(V)	(A)	(W)	(min^{-1})	(m^3/min)	(CFM)	(Pa)	(dB[A])	(g)
9GV5724H502	24	20.4 ~ 27.6	4.0	96	6,300	11.32	400	690	74	800
9GV5748H502	48	40.8 ~ 55.2	2.0							

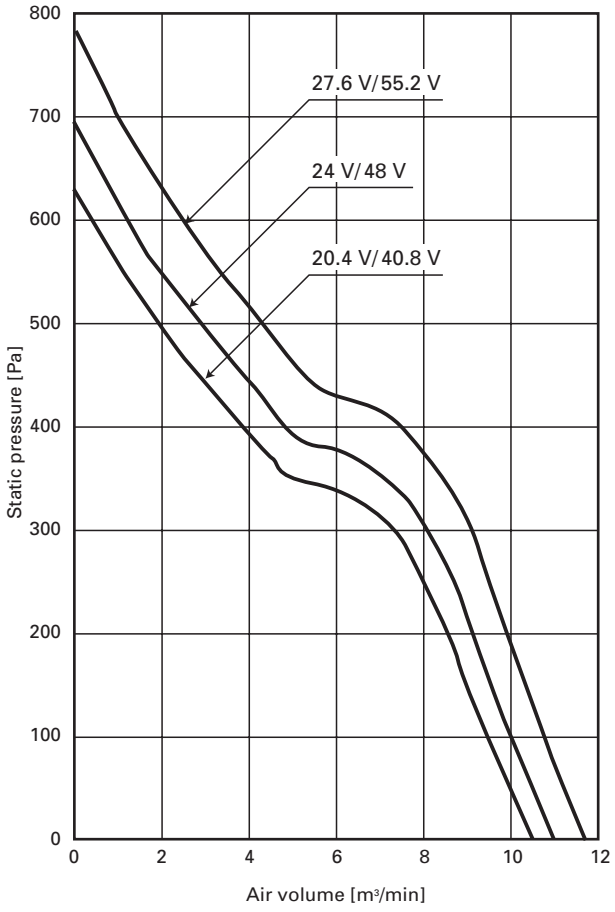

Figure 3 Air volume vs. static pressure characteristics

4.3 Expected lifetime

"San Ace 172" GV type fans have an expected life of 40,000 hours at 60°C (survival rate of 90% with continuous operation at the rated voltage under free air conditions and at normal humidity).

5. Comparisons with Conventional Models

This development has lead us to large air volume, high static pressure, low noise, and higher fluid efficiency through advances in frame and fan blade shape. Additionally, refinement of the drive mechanism has resulted in decreased power consumption.

The following shows the differences between the "San Ace 172" GV type and the highest performing of the currently available 172 mm diameter × 51 mm thick fans (109E5748C502).

5.1 Increased air volume and static pressure

Figure 4 shows the differences in air volume versus static pressure characteristics between the highest performing of the currently available 172 mm diameter × 51 mm thick fans and the "San Ace 172" GV type fan.

During this development, we used 3-D CAD modeling and rapid prototyping to design a frame and fan blades that maximize air volume and static pressure. For example, if a system impedance is assumed as shown in figure 4, the air volume of the conventional product at point A is 4m^3/min, while the "San Ace 172" GV type

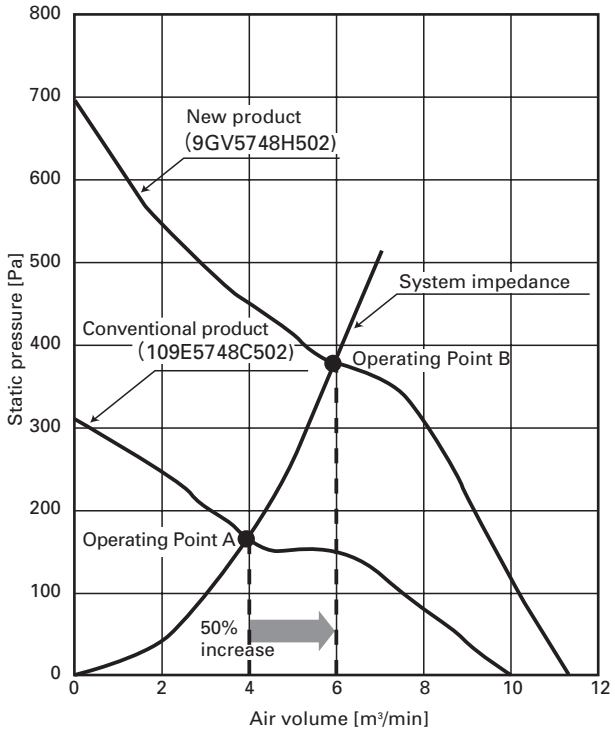

Figure 4 Comparison of air volume vs. static pressure characteristics

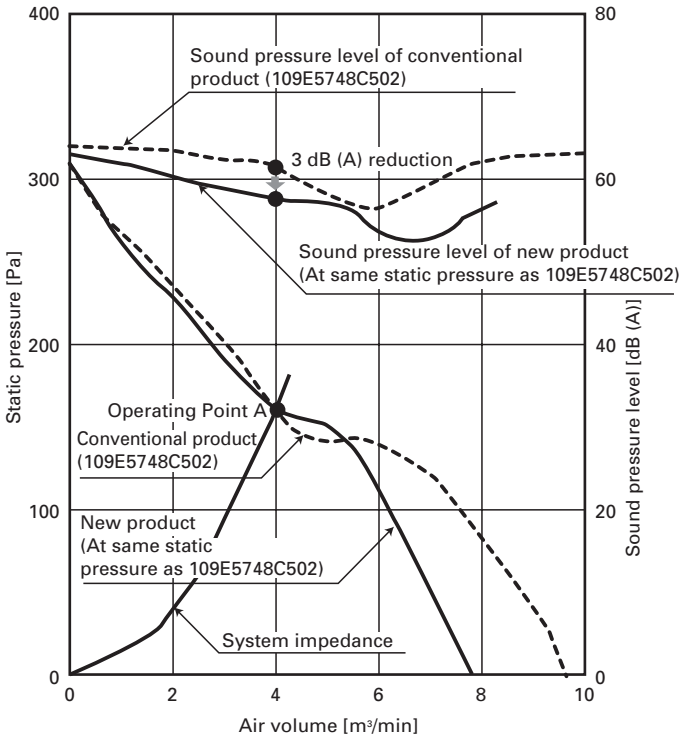

Figure 6 Comparison of air volume vs. static pressure characteristics and sound pressure characteristics

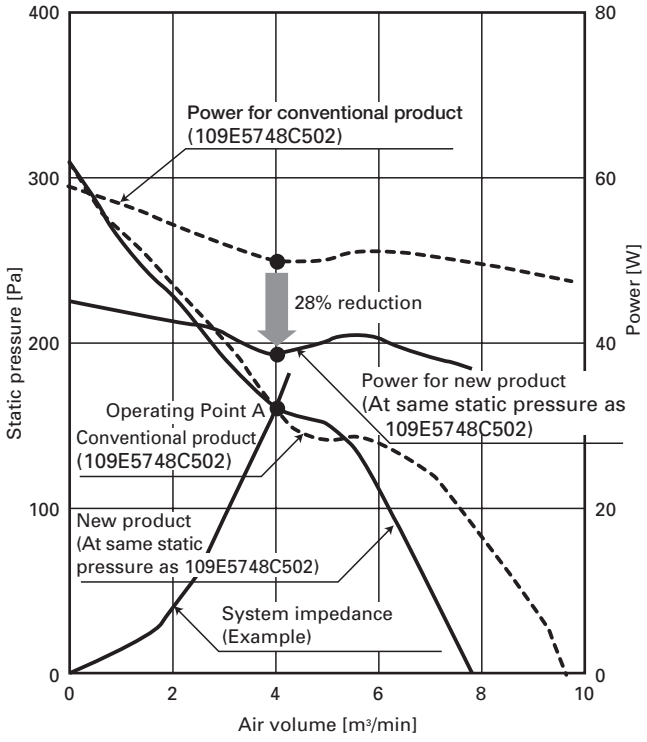

Figure 5 Comparison of air volume vs. static pressure characteristics and power consumption characteristicsa

fan has an air volume of 6m³/min at point B, a 50% increase in air volume.

5.2 Reduced power consumption

The "San Ace 172" GV type uses a new motor and drive circuit that were designed for efficiency.

For example, if the same system impedance as in section 5.1 is assumed and both the conventional product and the "San Ace 172" GV type fan are allowed to run at the same operating point A, the "San Ace 172" GV type fan consumes 28% less power than the conventional product, as shown in figure 5.

5.3 Reduced noise

For example, if the same system impedance as in section 5.1 is assumed and both the conventional product and the "San Ace 172" GV type fan are allowed to run at the same operating point A, the "San Ace 172" GV type fan produces 3 dB (A) less noise than the conventional product, as shown in figure 6.

6. Conclusion

We have introduced some of the functions and features of the new “San Ace 172” GV type fan.

When compared to our conventional products, this new fan has higher static pressure and lower noise while also offering reduced power consumption and overall improvement in function. As electronic devices generate more and more heat, and as high packaging density communications devices continue to grow more common, we feel that we can continue to improve the cooling needed to operate these devices.

This product offers reduced power consumption along with reduced size and mass as well as improved environmental impact. Because of its smaller environmental footprint, it has earned our ECO PRODUCTS mark (figure 7).

ECO PRODUCTS

Figure 7 ECO PRODUCTS Symbol

Takahisa Toda
Joined Sanyo Denki in 1997
Cooling Systems Division, Design Dept.
Worked on fan motor developed and design

Masato Murata
Joined Sanyo Denki in 1984
Cooling Systems Division, Design Dept.
Worked on fan motor developed and design

Jirou Watanabe
Joined Sanyo Denki in 1978
Cooling Systems Division, Design Dept.
Worked on fan motor developed and design