

“DYNA ACE” 25mm Thickness Fan

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1. Introduction

Recently information and telecommunications equipment, ex. server and telecom switches, have become smaller in size, higher in density, greater in function and faster in speed, all leading to an increase in heating output.

Fans used to cool this equipment require high reliability, compact size as well as large air volume and high static pressure.

In order to meet these demands, we have developed “DYNA ACE” 25mm Thickness Fan (172×147×25.4mm thick), which is a thin fan with a large air volume, high static pressure, low noise and high reliability. This is an expansion to the lineup of “DYNA ACE”.

This document introduces the outline of the product and features.

2. Background of the Development

We already have a 172×150×51mm thick fan (hereafter, conventional 51mm thickness) in the market as one of the “DYNA ACE” fan series. However, now that the applications are diversified, there is a need for a thin and high air volume fan which is able to mount on a 1U type (about 44mm high) fan tray, and also for effectively cooling high density mounted electric circuits by filling fans on a 19-inch rack.

To meet this need, we achieved substantial thinning and space-saving by making the thickness half (25.4mm) of the conventional 51mm thickness fan, and with a 147 mm width, one can arranged three “DYNA ACE” units laterally in a 19-inch rack. To meet this need, we successfully developed “DYNA ACE” 25mm Thickness Fan series with the performance equivalent to or better than that of the conventional 51mm thickness units.

3. Features of “DYNA ACE” 25mm Thickness Fan

Fig.1 shows the “DYNA ACE” 25mm Thickness Fan.



Fig.1 “DYNA ACE” 25mm Thickness Fan

Followings are the features of this product.

- (1) Thin-type
- (2) Large air volume – High static pressure
- (3) High reliability
- (4) Optimum for cooling a 19-inch rack (EIA standard)

The “DYNA ACE” 25mm Thickness Fan (hereafter, the developed product) is thinner than the conventional 51mm thickness, and realizes high air volume, high static pressure and high reliability via a newly designed wing, frame, and motor. Moreover, the modular rack-style devices that are popular today, especially the 19-inch rack, are now able to use three developed products in a 19-inch rack by changing the width of the fan from 150mm to 147mm.

3.1 Dimensions

Fig.2 shows a dimensional overview of the developed fan.

3.2 Specifications

3.2.1 General Specifications

Table 1 shows the general specifications of the development fan.

Rated voltages available are 12V, 24V and 48V, and rated Rotating Speeds available are H speed (3300 min⁻¹), F speed (3000 min⁻¹), M speed (2700 min⁻¹) and L speed (2400 min⁻¹), in addition to the high air volume specification of S speed (3500 min⁻¹).

3.2.2 Air Volume vs. Static Pressure Performance

Fig.3 shows the characteristic curve of air volume vs. static pressure property for the development fan.

3.2.3 Comparison with the Conventional 51mm Thickness Fan

Fig.4 shows the comparison of air volume vs. static pressure between the developed product and the conventional 51mm thickness product.

The standard performance of the conventional 51mm thickness fan is the maximum air volume of 6.4 m³/min and maximum static pressure of 138 Pa (rotating speed at 3050 min⁻¹). The developed product achieved maximum air volume of 6.8 m³/min and maximum static pressure of 146 Pa (rotating speed at 3500 min⁻¹). Therefore, it has achieved better performance than the standard performance of the conventional 51mm thickness though it has half the thickness of the conventional 51mm thickness.

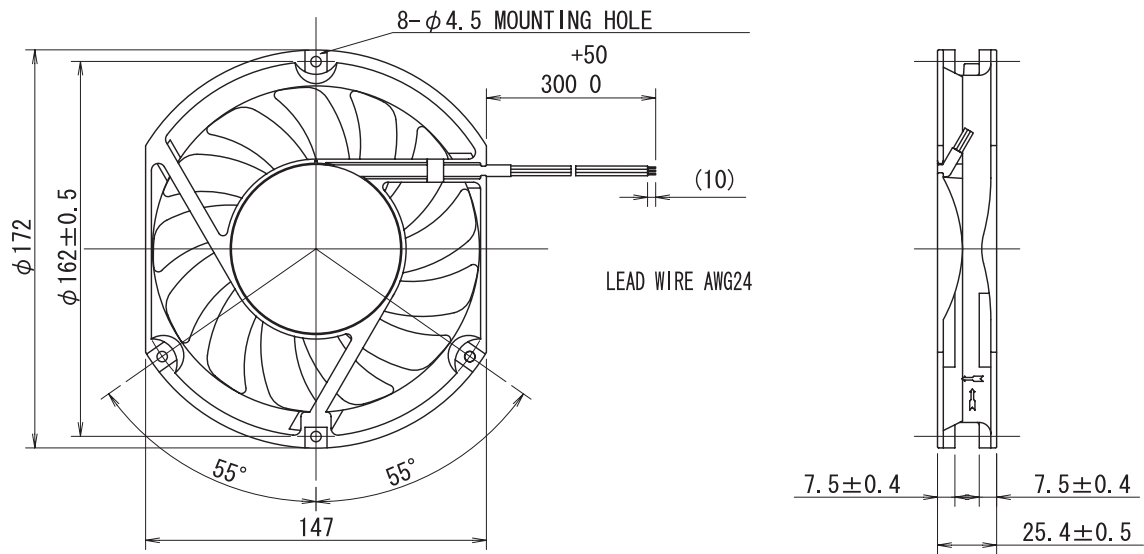


Fig.2 Dimension of "DYNA ACE" 25mm Thickness Fan

Table 1 General Specifications of "DYNA ACE" 25mm Thickness Fan Series

Model	Rated Voltage (V)	Operating Voltage Range (V)	Rated Current (A)	Rated Rotating Speed (min ⁻¹)	Max. Air Volume		Max. Static Pressure (Pa)	Sound Pressure Level (dB [A])	Weight (g)
					(m ³ /min)	(CFM)			
109E4712M402	12	10.2 ~ 13.8	1.5	2700	5.2	183	86	51	500
109E4712L402			1.1	2400	4.6	162	68	48	
109E4724H402	24	20.4 ~ 27.6	1.2	3300	6.4	226	130	57	
109E4724F402			0.87	3000	5.8	204	106	54	
109E4724M402			0.65	2700	5.2	183	86	51	
109E4724L402			0.46	2400	4.6	162	68	48	
109E4748S402	48	40.8 ~ 55.2	0.65	3500	6.8	240	146	58	
109E4748H402			0.62	3300	6.4	226	130	57	
109E4748F402			0.43	3000	5.8	204	106	54	
109E4748M402			0.34	2700	5.2	183	86	51	
109E4748L402			0.27	2400	4.6	162	68	48	

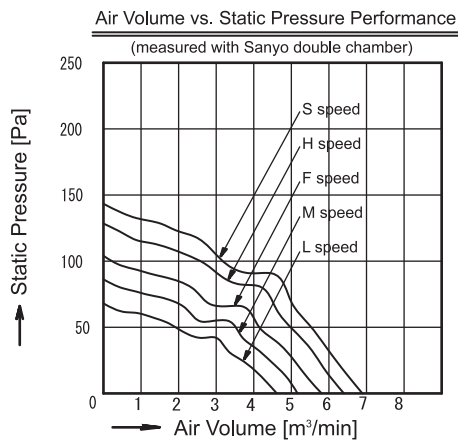


Fig.3 Example of Air Volume vs. Static Pressure Performance of "DYNA ACE" 25mm Thickness Fan

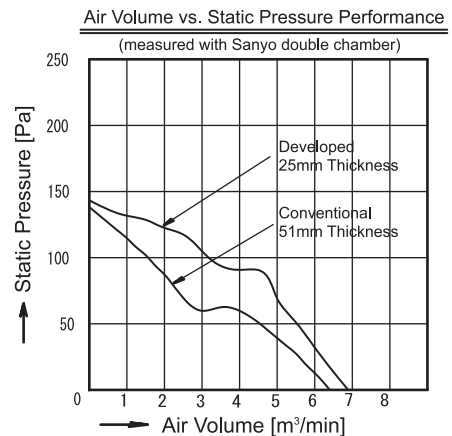


Fig.4 Comparison of Air Volume vs. Static Pressure Performance

3.2.4 Comparison Between the Conventional Fan and Tandem Running of Two Developed Products

Information and telecommunications equipment that require extremely high reliability may have 2 fans in series (tandem) to run redundantly in order to improve reliability of a cooling system and prepare for the potential emergency. For example, even if a fan would stop, the other one would keep running. Two developed products are able to work in tandem in the space same as that for a conventional 51mm thickness since the developed product is as half as thin as a conventional fan. Fig.5 shows the comparison air volume and the static pressure properties of a conventional 51mm thickness and 2 units of developed product running in tandem. The maximum air volume improves by 25% and the maximum static pressure improves by 56%. So besides placing the fans in tandem for emergency situations, there is also a performance benefit for doing so.

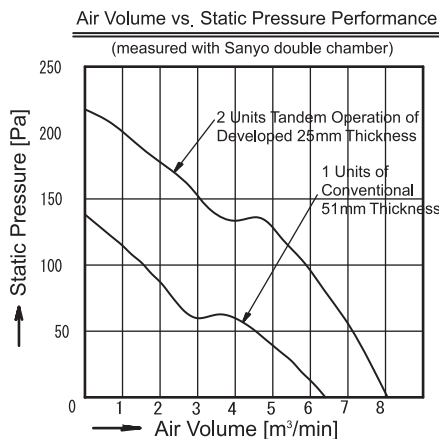


Fig.5 Comparison of Air Volume and Static Pressure Performance when 25mm Thickness Fan Work in Tandem

3.3 Structure

Fig.6 shows a structure of a developed product

A single-phase full-wave drive and brushless motor is used for the developed product. The bearing used in the developed product is the same as that in the conventional product. The life expectancy is 40,000 hours (at the ambient temperature of 60 and the 90% survival rate) with continuous running under the rated voltage.

Fig.7 shows the photograph in which three developed products are mounted in a 19-inch rack in optimal configuration (EIA standard).



Fig.7 Photograph Showing Three Developed Products Mounted in a 19-inch Rack (EIA standard)

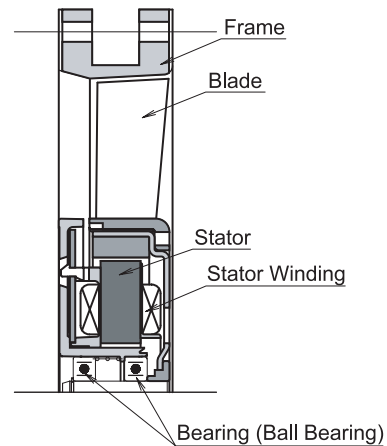


Fig.6 Structure of "DYNA ACE" 25mm Thickness Fan

4. Conclusion

This is our introduction of the structure and the performance of the developed "DYNA ACE" 25mm Thickness Fan. With the continued trends in component downsizing, higher densities, and increased heating outputs, we can expect higher demand for space-saving and large air volume fans. "DYNA ACE" 25mm Thickness Fan is expected to be used for these needs as well as a wide range of applications.



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