

BTX Standard Compliant CPU Cooler “SAN ACE MC” Thermal Module Type II

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1. Introduction

With the growth of the internet and increased digitalization of information, computers and other information equipment have even flooded into households. This information equipment requires cooling devices that can provide high cooling performance while also fulfilling abilities such as low noise, small size, and lower power consumption to meet the increasing demands of consumers and the environment.

In order to meet these demands, our company has developed the BTX compliant CPU cooler “SAN ACE MC” thermal module type II to achieve small size, light mass, and low power consumption while also providing high cooling abilities and low noise.

This document introduces an overview of the features of the product.

2. Development Background

BTX is a standard for cases or motherboards on desktop computers. This standard provides high heat liberation by considering the whole air flow, while also providing silencing properties by reducing the number of fans in the entire chassis.

CPU coolers that comply with the BTX standard have a structure known as a thermal module that contains the fan and heat sink in the duct. There are two types of thermal modules: Type I has a height of 98 mm, while Type II for thin systems has a height of 72 mm.

Our company previously produced a product that corresponded to the Type I thermal module, but we did not have a product that corresponded to Type II.

The normal method for achieving high cooling performance and low noise involves a fan that has a larger size and lower rotation speed. To achieve the same performance with a small fan, a higher level of technology and specialized design was required.

The newly developed Type II thermal module with the newly designed fan and heat sink provides the same high cooling

performance and low noise as found in the previous Type I thermal module (referred to below as “conventional model”), while achieving smaller size and lighter mass.

The newly developed model also achieves low power consumption compared to the conventional model due to the smaller fan and newly designed drive circuit.

These developments were combined together to make the new CPU cooler “SAN ACE MC” thermal module type II (referred to below as the “newly developed model”).

3. Product Features

3.1 Appearance

Fig. 1 shows a photograph of the newly developed model.



Fig. 1: CPU Cooler “SAN ACE MC” Thermal Module Type II

3.2 Dimensions

Fig. 2 shows the dimensions of the newly developed model.

3.3 Specifications

Table 1 shows the general characteristics for the newly developed model. Table 3 shows an example of PWM duty versus rotating speed.

Table 1: General characteristics

Model No.	Rated voltage	Operating voltage range	Rated current	Rated rotating speed		Thermal resistance	Sound pressure level	Mass
	(V)	(V)		(A)	(min ⁻¹)	(K/W)	(dB [A])	
109X7912PT1H012	12	11.4 - 12.6	0.36	Low speed (23.0°C or less)	2200	0.385	25	835
				High speed (35.5°C or higher)	5000	0.280	46	

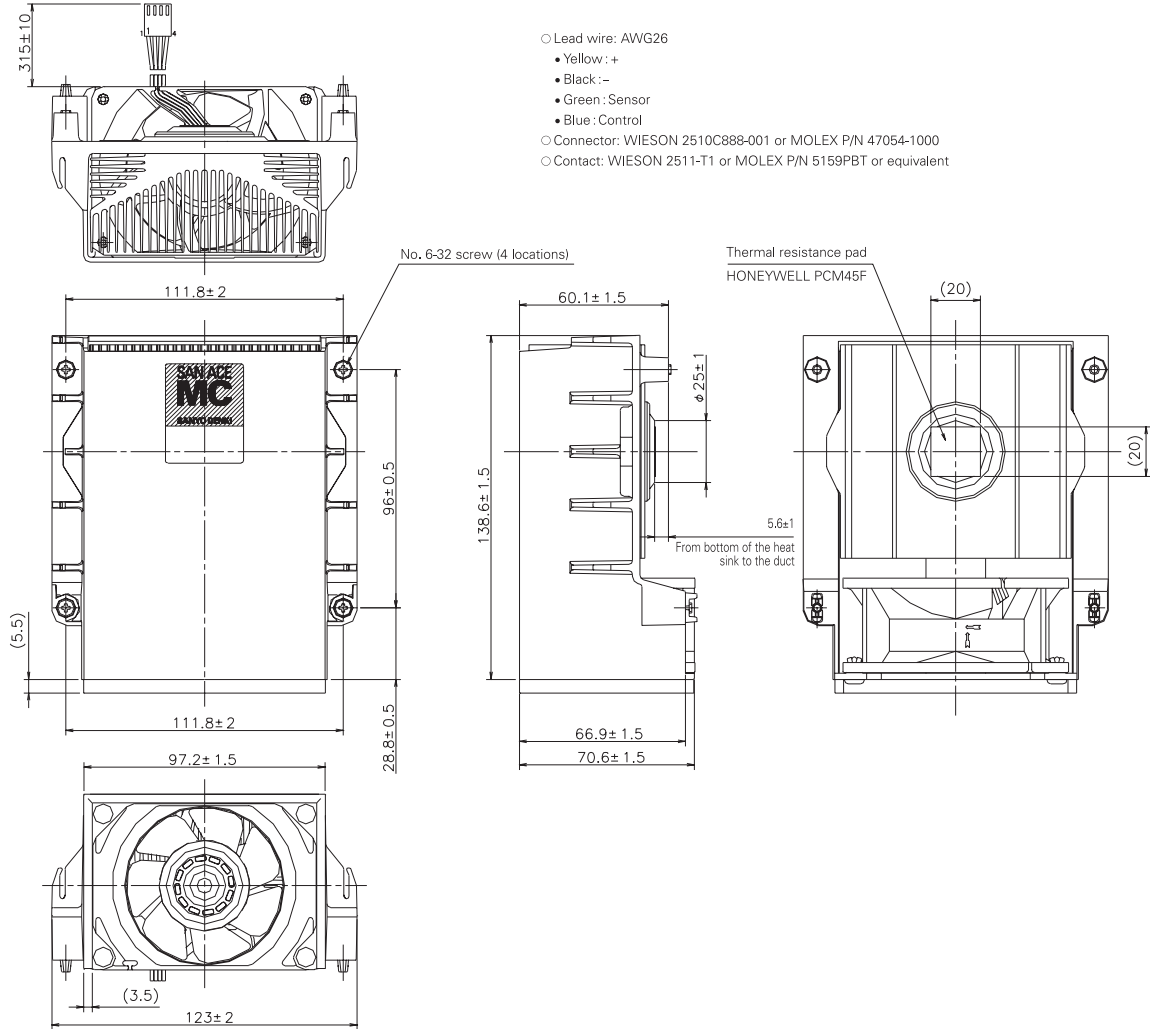


Fig. 2: "SAN ACE MC" dimensions (unit: mm)

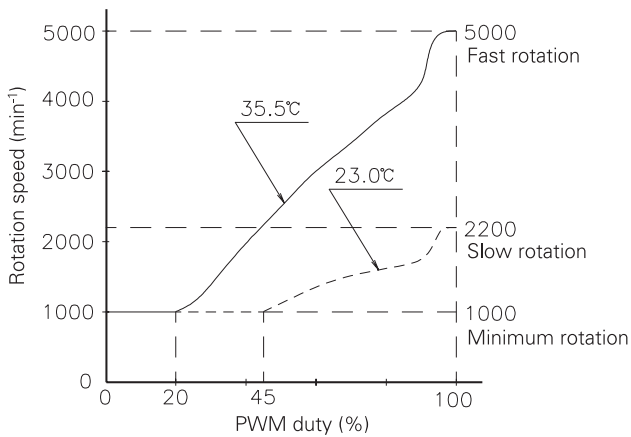


Fig. 3: Example of PWM duty versus rotating speed

3.4 Features

The newly developed model features new designs for the fan impeller, fan frame, heat sink, duct, and drive circuit to achieve optimal performance. The following features are included.

- (1) High cooling performance
- (2) Low noise
- (3) Small size and low mass
- (4) Low power consumption
- (5) Rotating speed control function that depends on ambient temperature
- (6) Rotating speed control function through PWM control

4. Comparisons with Conventional Model

This section compares the performance of the newly developed model and the conventional model.

4.1 Small size and low mass

Fig. 4 shows a photograph of the newly developed model and the conventional model. Fig. 5 shows a graph that compares the characteristics for the newly developed model and the conventional model at the same sound pressure level.

This graph uses value for the newly developed model as the standard value when running at high speed with a sound pressure level of 46 dB(A). The value for each characteristic of the conventional model is shown as 1 for easy comparison.

When the newly developed model uses the same sound pressure level as the conventional model, the cooling performance is about the same, the volume is reduced by 27%, and the mass is reduced by 14%. Even though the cooling performance and low noise remains the same for the newly developed model, the unit achieves smaller size and lower mass.



Fig. 4: "SAN ACE MC" thermal module
Conventional: Type I (left), New: Type II (right)

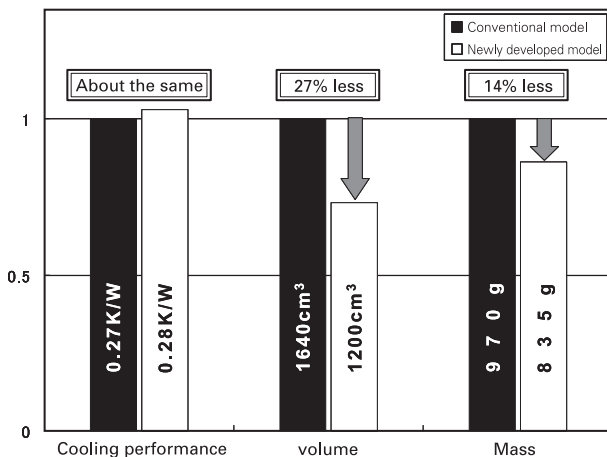


Fig. 5: Comparison of characteristics
at the same sound pressure [at 46 dB(A)]

4.2 Low power consumption

By using the thermal speed control function and the PWM control function, the newly developed model can be driven at the lowest required rotation speed for the ambient temperature and amount of heat produced from the device. This contributes to low noise and low power consumption on the fan. The conventional model has the same control functions, but since the newly developed model has a smaller size and new design for drive circuits, the power consumption can be reduced greatly compared to the conventional model.

Fig. 6 displays the power range of newly developed model and the conventional model for rotation at low speed through rotation at high speed.

Compared to the conventional model, the newly developed model has a smaller power range and achieves 60% less power consumption at high speeds.

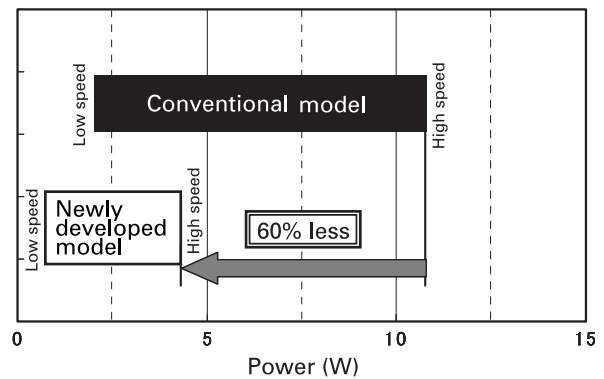


Fig. 6: Power range for rotation during low speed to high speed

4.3 Low noise

In addition to the information about the newly developed model noted in section 4.2, the new design for the fan reduces the sound pressure levels when compared to the conventional model.

Fig. 7 displays the sound pressure level range of the newly developed model and the conventional model for rotation at low speed through rotation at high speed. In particular, the sound pressure levels at low speed are 34 dB(A) for the conventional model, but only 25 dB(A) for the newly developed model, a reduction of 9 dB(A).

This enables the newly developed model to provide low noise when operating in the idle state with little heat produced from the device.

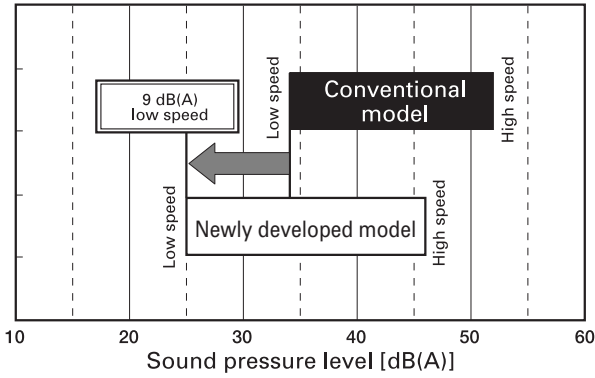


Fig. 7: Sound pressure level range for rotation during low speed to high speed

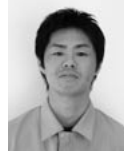
5. Conclusion

The newly developed “SAN ACE MC” thermal module Type II provides higher efficiency, lower power consumption, and lower noise when compared to the conventional Sanyo Denki products. This product provides a large contribution towards cooling devices as more and more information equipment is used in households.

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 (Fig. 8).



Fig. 8: ECO PRODUCTS symbol



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