The Design of Portable Integration Strengthening Machine

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ABSTRACT

This paper investigates briefly the integrated portable reinforcement machine structure design and introduces its design and train of thought. The authors also discuss design methods in engineering applications, as well as how to achieve good heat dissipation effect and enhance the electromagnetic compatibility. The whole machine, with its small volume, good adaptability to environment, and electromagnetic compatibility, can be used as a reference for similar engineering design.

Keywords: Electromagnetic Compatibility, Engineering, Heat Radiation, Integration Strengthening Portable Machine, Vibration

INTRODUCTION

Along with rapid development of the electronic chip technology, circuit competitive degree is taller and taller, equipment developed towards miniaturization, high performance. While the chassis as a basic factor of electronic equipment, and along with the electronic technology development its organization form is becoming more and more forward, towards miniaturization, the direction of human development. While the wide application of electronic technology, and the constantly increasing demands to adapt to various environment, such as car, ship equipment onboard, medium, this also prompted the reinforcement of computer generated. The so-called reinforcement machine is adapted to a variety of harsh environment for a long time and reliable work, the design of computer on the various factors affect the performance of the computer (system structure, electrical properties, mechanical and physical structure), to take corresponding measures to ensure the computer. But in some special conditions, the installation position and space constraints, it is need integration design for small reinforcement machine. This paper mainly based on the experience of engaging in structure design of integration, from the portable reinforced computer chassis design, thermal design, electromagnetic

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shoe design, vibration resistance design and three designs was elaborated concisely and to the point.

1. CHASSIS DESIGN

Reinforcement machine uses the CPCI bus structure; on the CPCI bus structure advantage please see the introduction of related data. Case size: 214X360X280 (length X width X height), composed of a box body frame, the left panel, upper and lower cover plate and the liquid crystal panel. Chassis structure used a cavity type structure design idea, mainly considered improving and optimizing the electromagnetic compatibility performance of equipment, according to the main functions, it included digital, analog and panel cavity, Panel cavity is close to the front panel of the casing part, mainly comprises a liquid crystal display device and driving module, operation module, keyboard, power switch and an indicating lamp; digital cavity is mainly installed a series of computer digital simulation module; cavity is mainly installed a series of signal module, external signal input interface is located in the left panel reinforcement machine, using the series high performance electric connector, an external input analog signal may be nearby the input analog processing module, reduce interference. All modules are using cold plate for reinforcing heat dissipation, the cabinet side board mounting groove for mounting, the wedge locking device for locking and fixing.

2. THERMAL DESIGN

Here only for this case which involves thermal design from the material selection, structure design and the module design of three parts to be simplify elaborated.

2.1. Material Selection

In the material, antirust aluminum is selected for chassis frame, corrugated plate is selected for heat dissipation in ventilation, which is characterized by not only good solder ability, low prices, but the thermal conductivity and ductility is very good. Chassis panel, cover plate, ribbed all select duralumin, its features is the excellent heat-conducting property and light weight.

2.2. Structural Design

In the structure, integrated portable reinforced computer chassis frame used vacuum brazing, this not only reduces the thermal resistance between the parts, forming a seal channel, improve the external transfer and heat conduction effect, but also improve the chassis seal, electromagnetic compatibility and integrity. While the power module is placed on the chassis of the end, through the heat conducting plate and the chassis close to achieve the purpose of heat dissipation.

2.3. Module Design

All modules within the enclosure housing used aluminum alloy materials which have excellent thermal conductivity, and to be thin as far as possible on the premise of not affecting the strength, thick wall is made of ribs. This can reduce the weight and take heat exchange with air around, the shell takes anodic oxidation blackening treatment, to improve the heat radiation effect. High-power heat element of surface affixed the shell is fixed, and is added rubber pad with heat conduction to accelerate heat radiation.

3. ELECTROMAGNETIC SHIELDING DESIGN

Electromagnetic shielding effect is cut off the electromagnetic energy from the space propagation way, achieve the purpose of eliminating electromagnetic interference. The shielding plate shielding box of portable reinforced computer adopts high conductivity alloy aluminum or steel, and takes the conductive oxidation treatment, so that it can maintain long-term conductivity. While the contact surface the between
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