



3.1 Green Commitment

● Eco-friendly Product Strategies

In the face of serious challenges posed by global warming and shortage of energy resources, MiTAC is committed to reducing environmental impacts in various ways. Compliance with international environmental laws, customer demands, and eco-friendly product design serve as the starting points. Harmful chemical substances are controlled from the source, while energy conservation and material saving are incorporated as main considerations in the product design process. Easy disassembly of products and simplified waste recycling are also important eco-friendly strategies to reach the short- and long-term goal of enhanced energy efficiency and reduction of harmful substances. To reduce environmental impacts generated during manufacturing processes, MiTAC has established an environmental management system and clearly formulated environmental management operating procedures to ensure an effective control of waste generation and energy usage during production processes.

Eco-friendly Product Strategies

- Establishment of an environmental management system
- Product design for the environment
- Green supply chain management
- Compliance with all applicable environmental laws and customer and other demands





3.1 Green Commitment

● 3.1.2 Introduction of Product Design for the Environment

- International environmental laws: From an international law development perspective, product design for the environment is now more than just concept promotion. Taking the ErP (EU) as an example, it has proposed that all energy-using products must adopt design for the environment to minimize resource depletion and pollution emission.
- Design for the environment: MiTAC has stipulated DfE (Design for Environment)/Eco-design as one of the prerequisites of product design, therefore we demand our R&D personnel take into consideration the products' environmental impact during different stages, including design, production, packaging, transportation, usage and re-cycle for re-use to waste disposal.
- Ecolabels: We distribute products that meet the highest eco-standards and eco-design requirements of different countries, such as the EPEAT and Energy Star of the USA, the SEPA and CECP of China, the Green Mark of Taiwan, the EU Flower of Europe, and the Blue Angel of Germany, in response to the customer's sales needs. To meet the green procurement threshold of different countries, we strive to fulfill the environmental protection requirements for the design, use, recycling, energy consumption and toxin allowance right at the product development stage.





3.2 Green Product Design

● 3.2.1 Product Design for the Environment Case Study

Product type	Key aspects of design for the environment	Design content and benefits
Thin client PC	<ul style="list-style-type: none"> ● Increases energy efficiency ● Ecological design ● Minimizes toxic environmental hazard 	<ul style="list-style-type: none"> ● Conforms to the GB28380 Minimum allowable values of energy efficiency and energy grades for microcomputers and the Energy Star international standard in the US. Adopt external power supplies that conform to the Level V standard in order to improve energy conversion efficiency. ● The plastic case is made from monomer plastics, metal and plastic that does not stick and are easily dismantled for recycling. The metal and plastic are not painted to increase the recycling rate. ● We only use plastics free from plasticizers (environmental hormone), HBCDD-free mainboards, CFC-free production process, materials complying with the RoHS recast and REACH standard and halogen-free materials in order to decrease environmental impact. ● Adoption of Level VI compliant power supplies for AIO series products ● Use plastics that do not contain the following four types of plasticizers (environmental hormones): DEHP, BBP, DBP, and DIBP and comply with the new hazardous substances added to RoHS in 2015/863/EU.
Servers	<ul style="list-style-type: none"> ● Increases energy efficiency ● Ecological design ● Minimizes toxic environmental hazard 	<ul style="list-style-type: none"> ● Comply with the current Energy Star 2.1 international standard in the US to increase energy efficiency. Use integrated power supply conforming to the 80Plus standard in order to improve energy conversion efficiency. ● Use CFC-free production process, materials complying with the RoHS recast and REACH standard to decrease environmental impact. ● Implement the modular mechanism design to achieve elasticity, adjustment flexibility, and easy maintenance, simplify future component upgrade and repair and maintenance, and accelerate new product development. ● Trial adoption of RoHS exemption (6a/6b/6c-alloy materials, 7c-i glass or ceramic piezoelectric material, 15-semiconductor package) components for specific server products and verifications. ● Trail PCB containing no BFRs/CFRs on specific server products for verification. ● Use plastics that do not contain the following four types of plasticizers (environmental hormones): DEHP, BBP, DBP, and DIBP and comply with the new hazardous substances added to RoHS in 2015/863/EU.



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Product type	Key aspects of design for the environment	Design content and benefits
Server mainboard	<ul style="list-style-type: none"> ● Optimize packing and shipping ● Reduce environmental impact 	<ul style="list-style-type: none"> ● Packaging materials are shared so that it can be used by 70% of the packing designs. This not only decreases stock materials but also saves purchasing cost, transportation fee and fuel. ● Minimize the materials, energy, water resources used for mold-making as well as waste water, air and material generated at the end of the production cycle, thereby effectively mitigating environmental impact. ● Redesign the space for accessories in order to increase the number of products per box. ● Replace complete user's manual with single-sheet Quick Guide, and electronic user's manual is available for download by the client. ● The outer packaging is made from 100% recycled paper pulp, and the internal packaging does not contain any paint. Only non-toxic and recyclable environmental material is utilized. ● Conforms to Packaging and Packaging Waste (PPW).
Drive Recorder	<ul style="list-style-type: none"> ● Optimize packing and shipping ● Reduce environmental impact 	<ul style="list-style-type: none"> ● Packaging materials are shared so that it can be used by 80% of the packing designs. This not only decreases stock materials but also saves purchasing cost, transportation fee and fuel. ● Minimize the materials, energy, water resources used for mold-making as well as waste water, air and material generated at the end of the production cycle, thereby effectively mitigating environmental impact. ● Redesign the space for accessories in order to increase the number of products per box. ● Replace complete user's manual with single-sheet Quick Guide, and electronic user's manual is available for download by the client. ● The outer packaging is made from 70% recycled paper pulp, and the internal packaging does not contain any paint. Only non-toxic and recyclable environmental material is utilized. ● Conforms to Packaging and Packaging Waste (PPW).



3.2 Green Product Design

● 3.2.2 Eco-friendly Products Materials

In light of limited resources on Earth, MiTAC is dedicated to mitigating excessive resource depletion, increasing resource utilization efficiency and lowering the use of high energy consumption resources. In terms of raw materials for the mass production of core products, the usage quantity is not only directly associated with operating performance, but also the depletion of environmental resources, therefore we regularly keep track of raw material consumption, hoping to improve raw material usage efficiency and decrease the amount of materials needed for packaging and shipping. All products comply with the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast) as in the RoHS recast Directive (2011/65/EU) and the RoHS Commission Delegated Directive (2015/863/EU). Based on the design requirements in the WEEE Recast Directive (2012/19/EU), the recycling rate of all materials used in products is over 80%.

3.2.2.1 Halogen-free Components

By adding flame retardants to plastics, we can slow down flame spread and thereby control the fire spread to save lives and property. Halogen is the most common flame retardant used in the IT industry for the following reasons: higher flame retarding efficiency, lower quantity of use, cheaper cost and better compatibility with different base materials. However, many studies have shown that when products come to the end of life (EOL), halogen will not only make materials more difficult to re-cycle for re-use, but will also produce a lot of smoke, dioxins and halogen compounds during incineration and heating for disposal. These substances are toxic to both the human body and the environment.

MiTAC included halogen-free in the product design requirements in 2010 and raises the proportion of halogen-free components by product type every year. By the end of 2018, the proportion of halogen-free components in commercial products (POS terminals, desktop specialty servers and datacenter servers) and consumer products is 72% and 64%, respectively. Although halogen-free is not a regulatory requirement for products and components, with the rising awareness of environmental protection, however, many countries have included halogen-free as a criterion for ecolabel review.



3.2 Green Product Design

● 3.2.2 Eco-friendly Products Materials

3.2.2.1 Halogen-free Components

The difference and analysis of halogen-free components in 2018 are as follows:

Difference by product category: A higher proportion of halogen-free components is found in commercial products because the proportion of server products is higher. To resolve the cooling and EMI problems, more non-plastic components are used in server products to raise the proportion of halogen-free components in this product category. As the demand for AI and cloud networks rises, branded server suppliers tend to use more halogen-free PCBs as the composite texture of halogen-free PCBs (with lower permittivity) can help reduce the low loss and raise high-speed signal transmission on PCBA. Composite plastics are largely used on consumer products requiring miniaturization and lighter weight to reduce the use of halogen-free components.

Difference by part category: The proportion of halogen-free is analyzed by part category. Basically, components are divided into modular components and non-modular components. Modular components include fans, screens, connectors, power cables, power supply units, etc., and non-modular components include active and passive components, ceramic capacitors, alloy crews, etc. Over 80% of non-modular components are halogen-free, as they are mostly made of ceramic, glass, alloy, metal, iron oxides, inorganic metal compounds, etc. with a higher melting point and higher enthalpy of vaporization. They do not need additional flame retardants to meet the UL-94 fire retardation requirements.

	Commercial Products (POS terminals, servers)	Consumer Products (dashcams, GPS)	Non-modular Components (active and passive components, capacitors)	Modular Components (fans, screens, power cables)
Halogen-Free Proportion	72%	64%	82%	19%
Halogen Proportion	28%	36%	18%	81%



3.2 Green Product Design

● 3.2.2 Eco-friendly Products Materials

3.2.2.2 Packaging Material

Packaging material is divided into sales/primary packaging, grouped/secondary packaging and transport/tertiary packaging. In order to minimize packaging material's environmental impact, we have recycled grouped/secondary packaging and transport/tertiary packaging used by our component suppliers for reuse during product shipment, thereby reducing the total volume of packaging materials used.

For procurement strategy related to the packaging of core products, besides complying with the Packaging and Packaging Waste Directive, 94/62/EC, PVC-free packaging materials are also introduced. EPE (extended polyethylene) is used in place of EPS (extended polystyrene) to protect products during transport, which in turn decreases environmental impact. As for decreasing transport/tertiary packaging, optimized packaging designs are adopted for shipping and air freight to maximize the product weight each pallet can carry.

