2 Design for Environment (DFE)

To create an infrastructure for designing environmentally friendly products, we're developing “green” design criteria to complement our conventional design review standards. And we're also working toward lead-free soldering.

1. Environmentally Friendly Product Design Criteria

We have been enhancing the guidelines and standards for engineers since 1997, and have issued a guideline and assessment standard for environmentally friendly product designs.

(1) Environmentally Friendly Product Design Guideline

This clarifies items that must be considered when designing “green” products, including not only environmental impact reduction but also disposal. The guideline defines mandatory rules on “green” product design, and addresses aspects such as:

- Design of long-life products
- Design of energy-efficient products
- Design of resource-efficient products
- Selection of materials and parts
- Recycling and disposal design
- Selection of machining and assembly methods

(2) Environmental Assessment Standard for Product Design

According to this standard, the environmental impact of every product design plan drawn up according to the Environmentally Friendly Product Design Guideline is assessed as shown in the table on the right. The progress of a series of product assessments is recorded on the Product Design Assessment Record Form.
This standard encourages engineers to set targets from the start of product design.

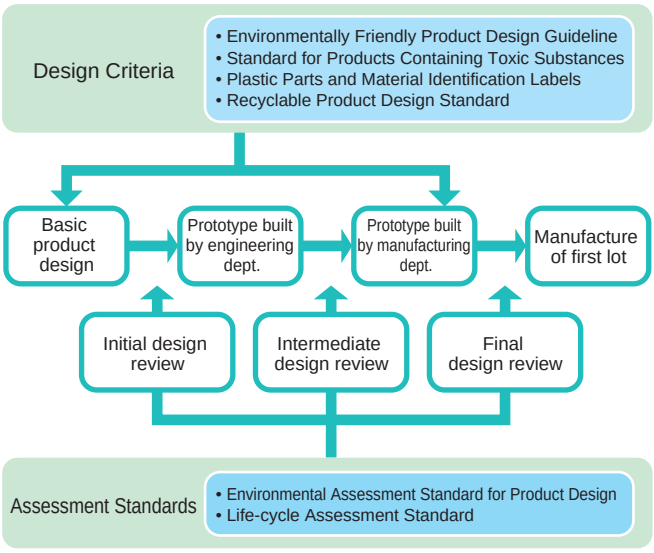
(3) Standard for Products Containing Toxic Substances

Environmental impact must be considered even when selecting materials and parts for a product. This standard regulates the use of toxic substances, categorizing toxic substances into prohibited substances and reduced-usage substances. When designing a product, every engineer must check that the parts used in the product do not contain environmentally harmful or prohibited substances, and must record the results on the Product Design Assessment Record Form.

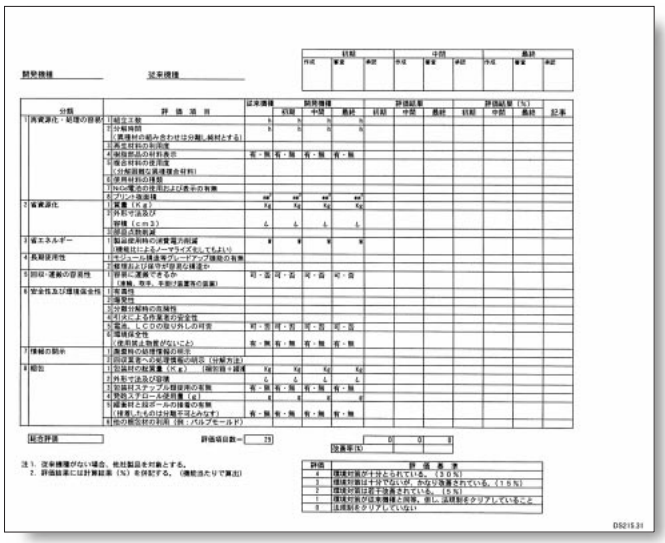
Environmental Assessment Standard for Product Design

Times of assessment	At initial, intermediate, and final design reviews
Assessment items	29 items including ease of recycling and disposal, resource efficiency, energy efficiency, long-term usage, ease of reclamation and transport, safety, environmental integrity, disclosure of information, and packing
Point rating	4 points if all the related legal regulations are met and there is improvement by 30% or more. 3 points if all the related legal regulations are met and there is improvement by 15% or more. 2 points if all the related legal regulations are met and there is improvement by 5% or more. 1 point if all the related legal regulations are met and there is improvement by less than 5%. 0 point if a related legal regulation is not met.
Pass/fail criteria	The product passes the standard only if no item receives zero points and the total number of points is larger than that of the previous model. The product fails if there is one or more items given zero points or if the total number of points is less than or equal to that of the previous model. The guideline of overall improvement is 25% from the previous model or a competitor's equivalent. The objective is to include environmental impact reduction in product design plans.

Environmentally Friendly Product Design Criteria and Assessment Standards



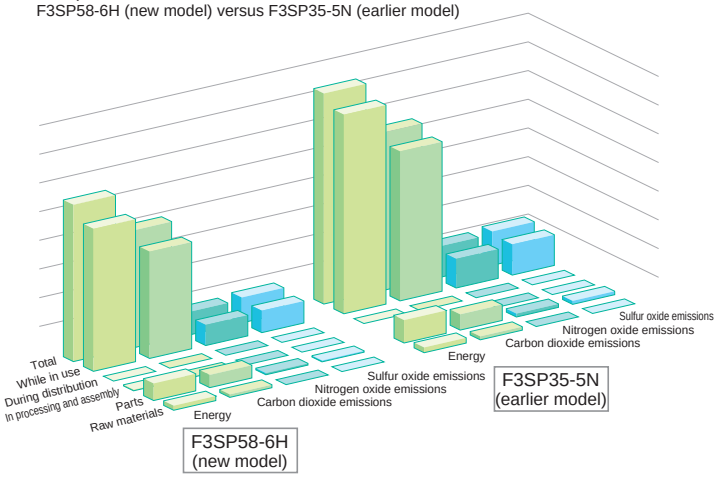
Product Design Assessment Record Form



(4) Life-cycle Assessment Standard
A life-cycle assessment, LCA for short, comprehensively evaluates the impact of a specific product on the environment throughout the lifecycle of the product, from material purchase, manufacture, and distribution to its use and disposal. We have developed an LCA tool for assessing a product quantitatively on a micro level in respect to energy consumption and carbon dioxide emissions. For the database, this tool uses NIRE-LCA from the Institute of Resources and Environment Technology in Japan.

Example of Comparison Chart using LCA Tool

Comparison of CPU Modules:
F3SP58-6H (new model) versus F3SP35-5N (earlier model)



(5) Recyclable Product Design Standard (issued in fiscal 2000)
Defines mandatory rules for product design to increase the recyclability of products. The rules are classified into four levels–materials, parts, products, and packing–in line with the 3Rs: to "reduce" the waste from used products or parts, and to "reuse" and "recycle" used products. This standard is applied from the early stages of product design together with the existing criteria for environmentally friendly product design. Adherence to this standard is checked at design reviews according to the Environmental Assessment Standard for Product Design.

2. Lead-free Solder

In comparison to conventional lead-based solder, lead-free solder poses various challenges if quality is to be maintained, such as its high melting temperature, the large amount of oxides generated, and the low soldering performance. To enable parts having greatly differing heat capacity to be soldered automatically on the same printed board at the same time, surface mount technology is being studied in detail. We have now established practical lead-free flow soldering systems for single-sided printed boards and double-sided re-flow printed boards. Our schedule for meeting the challenge is shown below.

Schedule towards Standardizing Use of Lead-free Solder