TI Corporate Citizenship
# Topic Brief

Responsible manufacturing

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Why it matters

We aspire to responsibly design and manufacture products that help solve some of the world's greatest social and environmental challenges. Sustainable technology design and production is a growth frontier for our company and our customers. Our innovations are already helping dozens of industries make their products more efficient, reliable and safer.

Ever wonder how a TI semiconductor chip is made? Take a journey through the life of a semiconductor chip with this look inside TI's manufacturing processes.
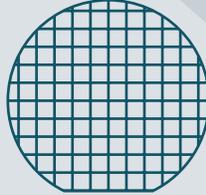
Our approach

Product responsibility encompasses nearly every aspect of our operations and is integral to the continual innovation of products needed to meet the world's demands. This includes helping ensure our customers' products are created and supported responsibly.

Our goals

We set both voluntary and regulatory goals to ensure the quality and reliability of our products as well as to maintain compliance with various environmental, safety and health (ESH) regulations. Specific goals are considered proprietary and are not reported publicly.

Oversight

Overseeing product responsibility at TI includes the following:

Audit committee, Board of directors
Oversees internal controls, compliance and performance

Chief financial officer
Ensures capital allocation for product development, manufacturing and sales aligns with TI's strategies

Senior vice presidents

- **Analog Power Products**
  Product responsibility leadership team: Ensures new designs and current products meet customer and regulatory requirements

- **High Volume Analog and Logic, Central Analog Services, DLP® Products and Education Technology**
  Product safety advisory team: Monitors product safety standards and trends

- **Embedded Processing**
  Product quality team: Monitors quality standards and trends

- **Analog Signal Chain**
  New product development execution team: Defines, plans, develops, verifies and releases new products to market

- **Technology and Manufacturing Group**
  Sales and distribution: Brings products to market

Semiconductor manufacturing

About 80 percent of our wafers are manufactured in-house within 15 manufacturing sites across nine countries. Our manufacturing capability is complemented by strong partnerships with foundry and subcontractor partners so we can scale production to address our customers' demand. With such flexibility, we help ensure continuity of supply for the more than 100,000 customers we support.

One of our competitive advantages is our large and robust manufacturing footprint. We were the first analog company to move to 300-mm wafer sizes in manufacturing, which helps us more efficiently produce more chips and reduce our use of chemicals, gases, water and electricity.

> See Environmental, Safety and Health and Materials Management to learn more about how we protect TIers and the environment during product manufacturing.

Quality

We control the quality of our products and closely monitor and regulate their performance through internal and external manufacturing processes and centralized materials purchasing. We also designed our:

- Quality policies and procedures to quickly address and resolve any quality-related issue that could arise, from new product qualifications and process change notices to timely resolution of customer issues and complaints

- Management processes and systems to meet or exceed internationally recognized standards and codes
    - Read the Quality System Manual (QSM000) to learn more about our quality management system's policies and procedures

- Quality guidelines to maintain compliance with numerous quality specifications and the latest industry standards
    - Our sites have been International Organization for Standardization´s (ISO) Quality Management System (ISO 9001) and Environmental Management System

(ISO 14001) certified since 1996, underscoring our commitment to meeting the highest quality standards
    - Access a complete list of our certifications

To evolve our processes, comply with industry standards and better meet our customers' needs, we routinely evaluate customer quality data and develop quality improvement plans. We also conduct internal audits, quarterly reviews and measure our progress against goals throughout our management systems.

Reliability

Most semiconductor devices have lifetimes that extend over many years at normal use. Since we cannot wait years to study a device, we conduct stress and temperature tests to accelerate potential fail mechanisms so that we can identify their root cause and fix them. The reliability of our product designs, processes, products and packages also must meet industry standards prior to release.

Our commitment to continuous improvement has reduced the number of customer returns. For more information, visit quality and reliability frequently asked questions.

Customer support

To manufacture products more sustainably, we train and engage employees, and listen to our customers. We also provide many ways for customers to get the support they need, such as information about manufacturing data, materials of concern, compliance against national and international sustainability standards, or reliability and environmental impact.

Education technology manufacturing

We outsource the manufacturing of our education technology products, which are used by educators and students worldwide. We develop these products with concern for environmental impact, including the type of materials used in their design, packaging and waste as well as product lifecycle.

We also require suppliers and contractors to comply with applicable ESH and quality laws and regulations, as well as our own standards, to ensure handheld graphing devices are made responsibly.

The TI-84 Plus CE and TI-Nspire™ CX graphing calculator operates on a rechargeable battery, which can last up to two weeks on a single charge. We also help recycle rechargeable lithium batteries as part of our involvement in the Call2Recycle program.

Product distribution

We ship thousands of products to customers around the globe when and where they need them. This is no small task, and with about 90 percent of our product sales outside the U.S., it is incumbent upon us to identify the most efficient modes of transportation to improve our bottom line and reduce our carbon footprint.

Strategy

Our shipping strategy leverages some of the world's largest transportation service providers to streamline our shipment process. We also strategically place our distribution centers and select our suppliers to ensure that we can continually deliver our products in the event of a natural or manmade disaster.

Our distribution centers are strategically located to facilitate efficiency, eliminate multiple product handling for individual customers, and pack the largest volume of products we can into each shipment. We also seek to limit air freight, as it is the most expensive mode of transportation. We set cost-reduction goals to save money where we can.

We continuously engage our business units to ensure that we can fulfill anticipated orders. We track shipments and our efficiency progress using an automated system that records daily activities worldwide. If customers have questions or concerns, they can contact our customer service managers.

Packaging

Responsible packaging and accurate product labeling are critical for timely distribution to customers and compliance with international shipping regulations. Larger and heavier packages can use more resources and impact our bottom line, which is why we try to:

- Increase packing density to move actual weight closer to charged dimensional weight
- Eliminate heavy and expensive custom-cut foam,

nonrecyclable foam, and foam and cardboard waste
- Reuse our own packaging materials whenever possible

To transport semiconductor chips between our manufacturing sites and our customers, we reuse packing material. We also stack chips vertically, which reduces board space and total energy and cooling costs. Additionally:

- DLP® products are shipped to customers in nontoxic, reusable plastic packages. These are reused multiple times and eventually recycled.
- Many European Union member states recycle Education Technology display packaging under the Green Dot program. A green dot indicates that the packaging is part of a private recycling system and that expenses for proper reuse or disposal have been paid.

In Japan, we use the Multipak packing system, which enables customers to return the entire package (box and shipping materials) to a third party, which certifies the packing for reuse. If the materials do not pass inspection, they are recycled.

Labeling

Both our customers and the countries where we operate have different label requirements based on the type of material shipped to ensure they meet substance restrictions and other requirements.

For example, to conserve materials and comply with global regulations, we ship semiconductor lead (Pb)-free products using packing labels that meet the standard set jointly by the IPC-Association Connecting Electronics Industries and the Joint Electronic Device Engineering Council J-STD-609. It is an ongoing objective to comply with these ever-changing regulations and import/export laws while still ensuring the timely delivery of our products.

By default, we use TI standard labels and create custom labels per customer requirements if needed. We share information on the possible environmental and social impacts of our products on our ecoinfo page and in our product content tool. We also provide applicable safety information in our product literature.

Our Restricted Chemicals and Materials program requires material suppliers and external manufacturing to provide appropriate information for TI to assess compliance to restricted chemicals and materials requirements at least annually. We assess and indicate on our labels and through our web pages the compliance status of integrated circuit components to all known regulatory and industry requirements. We also publicly report our efforts to trace potential conflict minerals in our supply chain.

Customers can incorporate our product content data into their product assessments because they are ultimately responsible for managing any social or environmental impacts that result from disposal of their end products (e.g., cell phones or computers).

Life cycle assessments

We are working to provide life cycle assessment (LCA) data of our technologies to help customers conduct their own LCAs. Like other semiconductor companies, we manufacture thousands of component products, which makes it infeasible to conduct LCAs on each. Moreover, much of this information is proprietary.

However, we work continuously to enable more energy-efficient semiconductor chips while operating responsibly and reducing environmental impact. For example, we responsibly source 100 percent of metals* for integrated circuit chips from certified conflict-free sources. Our critical production suppliers participate in an assessment of their environmental and social programs as well.

Each year, we average the amount of water, energy and other materials needed to produce a representative semiconductor device and share that information with our customers. You can find the per-chip data in our annual Citizenship Performance Report. Since 2005, we have realized per-chip reductions in energy and water use as well as in greenhouse gas emissions. We will continue working with our industry counterparts to determine a standardized and consistent approach to specifically calculate such information.

Product end-of-life

We address product end-of-life and disposal issues both as a components manufacturer and as a producer of consumer devices.

Semiconductors

Although we cannot control how customers handle the semiconductors they place in their products, nor their products' end-of-life issues, we provide customers with detailed information about the substances used in our components so they can make informed decisions about end-of-life disposal. This data can be found using our product content tool as well as in the statements addressing substances of environmental concern on our ecoinfo website.

Education Technology

We work to reduce waste by designing Education Technology products with flash technology, which enables consumers to download software applications, extending the products' life span and long-term value. We also design our calculators to withstand years of classroom use.

Additionally, we participate in take-back programs in the European Union, where under the Waste Electrical and Electronic Equipment Directive, all companies that sell such equipment must have end-of-life collection for electronic or electrical products. We contract with qualified third parties to manage this program.

Outside the EU, government jurisdictions have different policies and regulations regarding management of electronic waste. To ensure compliance, we continuously monitor the varying obligations for registration and certification, labeling, batteries and product packaging.

When customers return units that are still under warranty, we send those products to a de-manufacturer for recycling.

*Tantalum, tin, tungsten and gold