World Electronic Components, a new study from The Freedonia Group, is designed to provide you with an in-depth analysis of the major trends in the world market for electronic components and the outlook for product segments and major markets -- critical information to help you with strategic planning.

This brochure gives you an indication of the scope, depth and value of Freedonia's new study, World Electronic Components. Ordering information is included on the back page of the brochure.

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Global demand for semiconductors and passive electronic components is projected to increase 9.5 percent per year through 2004 to close to $440 billion, a slight acceleration from the mid/latter 1990s pace.

The best growth prospects for electronic components will increasingly be found in developing countries where electronics-related original equipment markets are less evolved.

Electronic components demand will decelerate in the US and most other industrialized countries from recent unsustainably rapid rates, although growth markets such as third-generation mobile phones and Internet-related products (routers, servers, interfaces, network processors, etc.) will provide some offsetting support.

High-end integrated circuit (IC) devices such as microprocessors and digital logic ICs hold particularly good prospects, including advanced variants on the former such as microcontrollers and digital signal processors (DSPs).

The largest electronic component producing countries are the United States and Japan, each with annual shipments in excess of $50 billion as of the latter 1990s.

Leading semiconductor producers include Advanced Micro Devices, Intel, Motorola and Texas Instruments of the US; Infineon Technologies, Philips Electronics and STMicroelectronics of Western Europe; Hitachi, NEC and Toshiba of Japan; and Hyundai and Samsung of South Korea.

On the passives side, leading factors include AMP (acquired by Tyco International in April 1999), Molex and Vishay Intertechnology of the US; EPCOS of Germany; Framatome of France; and Kyocera, Murata Manufacturing and TDK of Japan.

* This study analyzes global supply and demand for electronic components, defined as semiconductors -- including both integrated circuits and discrete devices (including optoelectronic components) -- and passive components (defined as connectors, capacitors, inductors, resistors, microwave components, electronic filters, piezoelectric crystals and oscillators). Excluded from the scope of the study are semifinished products such as semiconductor parts, dice, wafers, etc., as well as miscellaneous types of products sometimes considered electronic components, such as switches, sensors, keyboards, recording heads, wiring harnesses, sockets, etc.
Study Highlights

World Electronic Components Demand
(million US dollars)

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<tr>
<td>Gross Domestic Product (bil 1997 US$)</td>
<td>30406</td>
<td>35608</td>
<td>42490</td>
<td>51200</td>
<td>3.2</td>
<td>3.6</td>
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<tr>
<td>$ component/000$ GDP</td>
<td>5.9</td>
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<tr>
<td>Electronic Components Demand</td>
<td>178.0</td>
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<td>By Region:</td>
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<td></td>
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<tr>
<td>North America</td>
<td>71.9</td>
<td>119.5</td>
<td>175.6</td>
<td>252.4</td>
<td>10.7</td>
<td>8.0</td>
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<tr>
<td>Western Europe</td>
<td>29.2</td>
<td>45.0</td>
<td>67.4</td>
<td>96.0</td>
<td>9.0</td>
<td>8.4</td>
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<td>Japan</td>
<td>36.1</td>
<td>38.3</td>
<td>59.2</td>
<td>84.5</td>
<td>1.2</td>
<td>9.1</td>
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<tr>
<td>Other Asia/Pacific</td>
<td>35.6</td>
<td>65.9</td>
<td>118.5</td>
<td>200.7</td>
<td>13.1</td>
<td>12.5</td>
</tr>
<tr>
<td>Rest of World</td>
<td>5.3</td>
<td>8.9</td>
<td>15.9</td>
<td>26.1</td>
<td>10.9</td>
<td>12.3</td>
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<td>By Type:</td>
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<td></td>
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<tr>
<td>Semiconductors</td>
<td>134.5</td>
<td></td>
<td></td>
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<tr>
<td>Passive Components</td>
<td>43.5</td>
<td>54.8</td>
<td>76.4</td>
<td>102.0</td>
<td>4.7</td>
<td>6.9</td>
</tr>
</tbody>
</table>

% Annual Growth

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Design & Fabrication Trends

Although integral in all segments of the electronic components industry, design and fabrication technology is particularly critical in the integrated circuit area, given the extremely detailed product specifications and the technically stringent manufacturing requirements inherent at this end of the business. There are essentially two types of IC fabrication techniques: bipolar and MOS and its derivatives. The older technology by about a decade, bipolar ICs are composed of transistors that carry both positive and negative charges. MOS ICs derive their name from their physical construction, metal-oxide semiconductor. MOS devices are composed of a layer of semiconductor substrate material (usually silicon) topped by a layer of an insulating material through which current does not flow and is itself topped by metal in which the gates are etched; the insulating material is an oxide of the semiconductor substrate material. On balance, MOS chips are easier to produce, take up less space, allow higher levels of integration and are faster than their bipolar counterparts, and as a result have largely supplanted them in most developed world settings. CMOS (complementary metal oxide semiconductor) ICs add the advantage of lower power consumption, which means less heat generated and thus even higher levels of integration possible. Illustrative of the potential in this area is Conexant Systems (spun off from Rockwell International in 1999), which has a joint venture with Japan-based Sharp to develop 0.18- and 0.15 micron CMOS process technologies (one micron is equivalent to one-one thousandth of a millimeter).

The somewhat unique economic dynamics of the semiconductor business, coupled with the advent of highly sophisticated computer-based design techniques, have led to the emergence of so-called “fabless” design houses over the past decade or so, particularly within the developed world. Such entities develop microchip
Market Overview

The Market Overview Section highlights the key issues that have affected the global electronic components market over the past ten years and summarizes contributing growth factors with forecasts to 2004 and 2009.

This information helps you:

- Focus your sales and marketing efforts on high growth areas.
- Propose new areas for development.

Semiconductors

Global demand for semiconductors is projected to increase just over ten percent per annum through 2004 to some $360 billion, noticeably faster than passive devices. Semiconductors are by far the most widely used class of active electronic components, having largely (although by no means totally) supplanted earlier-generation tube-based devices. Semiconductors can be further segmented into discrete devices such as transistors and diodes (for present purposes, the discrete segment also includes optoelectronic semiconductors, which operate at the lightwave frequencies of the electromagnetic spectrum). Integrated circuits, in turn, can be further classified into three basic types: memory, logic and linear (also available are hybrid devices, which possess characteristics of both ICs and passives and are used in more specialized applications).

Memory chips are used to store information, while logic ICs perform complex mathematical and computational tasks at high speeds; linear ICs are used with analog (as opposed to digital-based memory and logic) circuitry, and perform such functions as voltage regulating and analog-to-digital/digital-to-analog conversion. Logic ICs, consisting of microprocessors (including variants such as...
The Markets Section analyzes supply and demand trends in each country and region.

**LATIN AMERICA**

**Argentina - Outlook & Suppliers**

Demand for electronic components in Argentina is projected to increase close to twelve percent per year through 2004 to $725 million, near the Latin America forecast average pace and an improvement over the recession-impacted late 1990s performance. Fueling gains will be ongoing development of the country's downstream electronic products manufacturing industries, as investment returns to difficulties. Illustrative of the 2000 indicated that it was component manufacturing facility in investment, shipments of industry will rise 9.6 percent per nevertheless slower than demand and.

**ASIA/PACIFIC**

**Malaysia - Supply & Demand**

Shipments of electronic components from facilities located in Malaysia approached $16 billion in 1999, which represented the fourth largest industry in the Asia/Pacific region behind only Japan, South Korea and Taiwan. The Malaysian electronic components industry -- dominated by the back-end assembly and testing of semiconductors -- has emerged as an export-led power after the pattern of its downstream electronics OEM counterparts in the country. Illustrative of this, net exports were equivalent to more than 55 percent of output value as of the latter 1990s, with Malaysia ranking fourth in the Asia/Pacific region, as well as the US. Originally attractive primarily because of low labor costs and geographic advantages, the steadily increasing technical capabilities of Malaysia's semiconductor production base has drawn in still greater amounts of external capital to the country and resulted in a sharp expansion in the size of the local industry. For example, value of electronic components shipments from Malaysian facilities increased nearly fivefold between 1989 and 1999, about as fast as in any country in the world over that period, even after factoring in some significant slowing in 1997-1998 associated with the Asian financial crisis. Output encompasses virtually the entire range of semiconductor products, including microprocessors, microcontrollers, memory, digital logic, and passive components.

Demand for electronic components in Malaysia totaled $6.9 billion in 1999, which while dwarfed by local production still represents one of the half dozen or so:

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<td>Electronic Equipment Shpts (bil $)</td>
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<td>56.1</td>
<td>94.0</td>
<td>135.0</td>
<td>185.0</td>
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<tr>
<td>$ component/000$ shpt</td>
<td>76</td>
<td>96</td>
<td>104</td>
<td>107</td>
<td>108</td>
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<tr>
<td>Electronic Components Demand</td>
<td>3127</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>By Type:</td>
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<tr>
<td>Semiconductors</td>
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<td>Integrated Circuits</td>
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<td>3661</td>
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<td>1021</td>
<td>1240</td>
<td>1570</td>
<td>2000</td>
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<td>Memory</td>
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<td>777</td>
<td>1294</td>
<td>1980</td>
<td>2600</td>
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<td>Digital Logic</td>
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<td>408</td>
<td>543</td>
<td>813</td>
<td>1000</td>
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<td>Other</td>
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<td>745</td>
<td>1000</td>
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<td>Discretes &amp; Optos</td>
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<td>677</td>
<td>860</td>
<td>1150</td>
<td>1500</td>
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<tr>
<td>Passives</td>
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<td>902</td>
<td>1200</td>
<td>1500</td>
<td>2000</td>
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<td>386</td>
<td>485</td>
<td>625</td>
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<td>147</td>
<td>267</td>
<td>320</td>
<td>390</td>
<td>460</td>
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<tr>
<td>Other</td>
<td>156</td>
<td>316</td>
<td>395</td>
<td>475</td>
<td>560</td>
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<td>By Use:</td>
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<tr>
<td>Information Technology</td>
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<td>Industrial &amp; Transportation</td>
<td>946</td>
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<tr>
<td>Consumer &amp; Other</td>
<td>372</td>
<td>602</td>
<td>670</td>
<td>800</td>
<td>1000</td>
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</tbody>
</table>

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Gain a better global understanding of your competition and analyze your company’s position in the industry with information about:

- industry composition & market share
  - semiconductors
  - passives
- research & product development
- manufacturing
- marketing & distribution
- financial requirements
- mergers & acquisitions
- industry restructuring
- strategic partnerships

INDUSTRY STRUCTURE

Marketing & Distribution

Given the intensely competitive nature of most segments of the electronic components business, it is hardly surprising that marketing strategies are critical determinants of success in the industry. Complicating matters is the highly diverse array of markets into which these types of products are sold, including highly fragmented OEMs (computer manufacturers, automakers, telecom and broadcast equipment producers, consumer electronics manufacturers), as well as the government/defense sector -- selling to which involves an entirely different set of considerations. Adding further complexity is the global nature of the business, which requires vendors to maintain multinational marketing operations. Because they are designed for ultimate installation into OEM electronic systems, most electronic components are sold to manufacturers of electronic equipment and subsystems either directly via company sales forces and distribution centers, or through independent distributors. Distributors maintain an inventory of standard, catalog, commodity-type products that are sold with little promotional support; the principal consideration in such cases is product availability at the time the customer needs it. Such products tend to be highly price-sensitive and exhibit rigid demand curves, giving manufacturers little freedom to resist prevailing trends. By contrast, more specialized, application-specific devices involve more formal marketing programs, sometimes involving interaction between the vendor’s sales and engineering staffs with the customer. While standardized, mass-produced items are quite well-represented in the electronic components business, there are any number of other products manufactured in shorter production runs.

The burgeoning size of the overall world electronic components business over the past three-plus decades has spawned a components distribution industry of sizeable

Selected Strategic Partnerships

Present examples of more than 70 selected strategic partnerships involving electronic component manufacturers.

SAMPLE TABLE

Order form on last page
Company Profiles

The profiles section analyzes 40 companies active in the world electronic components industry. These profiles represent a sampling or cross-section of the types of companies involved in the industry.

Divisions, subsidiaries, joint ventures, etc., are discussed under appropriate parent companies.

Sources for profiles included:

- Information provided by key staff members in the respective companies
- Annual reports
- 10-K reports
- Security analysts reports
- Corporate product literature

STMicroelectronics NV
20 Route de Pre-Bois
ICC Bloc A1215
Geneva 15
Switzerland
41-22-929-2929

STMicroelectronics Incorporated
1310 Electronics Drive
Carrollton, TX  75006
972-466-6000

STMicroelectronics (ST) designs, develops, manufactures and markets over 3,000 semiconductor integrated circuits (ICs) and discrete devices for automotive, computer, telecommunications, consumer and industrial applications. The Company operates through five groups: Telecommunications, Peripherals and Automotive; Consumer and Microcontroller; Memory Products; Discrete and Standard ICs; and New Ventures Group and Other. ST had 1999 revenues of $5.1 billion ($1.8 billion to Europe; $1.2 billion to North America; $1.9 billion to the Asia/Pacific region and $169 million to all other areas). The Company employs 34,500.

The Company is active in the global electronic components industry through its Telecommunications, Peripherals and Automotive; Consumer and Microcontroller; Memory Products; and Discrete and Standard ICs groups. Through these groups, ST designs, manufactures and sells a wide variety of discrete semiconductor devices, memory and standard commodity components, application-specific ICs (ASICs) and application-specific standard products (ASSPs) for analog, digital and mixed-signal applications. In 1999, the Company focused on the development...
Freedonia does not just collect and reprint data; Freedonia develops data. Our analysts thoroughly investigate an industry by extensively interviewing key industry participants and analyzing information from sources such as associations, government and trade literature. Once this research is complete, Freedonia establishes one set of forecasts. All writing, editing and forecasting is done in-house to assure quality and consistency. In cases where data does not exist, Freedonia develops the data based on input/output ratios, bills of materials and flow charts. The following chart summarizes Freedonia's methodology.
The Freedonia Group, Inc. is a leading independent international industry study/database company.

Since 1985, Freedonia has published over 1,500 titles covering areas such as plastics, chemicals, biotechnology, coatings and adhesives, building materials, industrial components and equipment, health care, packaging, household goods, security, and many other industries.

Freedonia has produced a wide variety of titles, including:

- Conductive Polymers
- Insulated Wire & Cable
- Passive Components
- Smart Cards

Because Freedonia is a reliable information source, our forecasts are cited in numerous publications such as The Wall Street Journal, The Financial Times and Purchasing.

In-house operations
Because all of our staff work at the same location, interaction between analysts and departments provides a strong system of checks and balances.

Consistency
Our Economics Group develops indicators that are used by all analysts. Therefore, every Freedonia study is based on a consistent set of unbiased economic assumptions (GDP, electronic equipment shipments, population, etc.).

Reliable forecasts
Because all of our forecasts consider the environment in which a product or industry is operating, as well as threats and opportunities to the market, Freedonia forecasts are reliable indicators of future performance.

One-on-one interviews
All studies are produced by conducting interviews with key industry participants and end-users.

Proprietary electronic database
Freedonia’s analysts tap into an extensive in-house electronic database containing corporate literature (including private company information), trade publications, government reports and many other sources of information.
About Our Customers

Freedonia's clients include major US and international companies in the manufacturing, services, consulting and financial sectors.

Typical purchasers of Freedonia studies:

- Key Executives
- Corporate Planners
- Market Researchers
- Financial Analysts
- Information Centers
- New Product Developers
- Merger & Acquisition Specialists

Since 1985 we have provided research to customers ranging in size from global conglomerates to one-person consulting firms. More than 90% of the industrial companies in the Fortune 500 use Freedonia research to help with their strategic planning.

Some of Freedonia’s customers in the electronic components industry include: Hitachi, Lucent Technologies and Siemens AG, Motorola, Samsung and NEC Corporation.
Biochips
The US biochip market - poised to take advantage of the flood of information from the Human Genome Project - will reach $1.7 billion in 2004. Explosive growth will be led by a range of applications in biomedical research that streamline the drug discovery process and create more powerful tools for diagnosis, disease management, and toxicological monitoring. This study analyzes the US biochip industry to 2004 and 2009 by type, application and market. It also evaluates market share and profiles key firms.
#1365. . . . . . . 12/00. . . . . . . $3,600

World Advanced Ceramics
This study covers the world market for advanced ceramics. Demand is presented in millions of US dollars for advanced ceramics by type (e.g., alumina, titanate, ferrite, zirconia, silicon carbide, cordierite, beryllia, silicon nitride); by market (e.g., electronics, transportation); and by geographic region. Includes historical data for 1989, 1994 and 1999 and forecasts to 2004 and 2009. The study also discusses manufacturing technology and the regulatory environment, evaluates market share and profiles key companies.
#1356. . . . . . . 11/00. . . . . . . $4,200

World Batteries
Growth in worldwide battery demand will be fueled by new and emerging types of portable electronic devices in need of power sources. Key growth areas include lithium ion- and lithium polymer-based rechargeable batteries, and “superpremium” alkaline batteries able to run high-drain products such as cell phones and camcorders. This study analyzes the $40+ billion world battery industry to 2004 and 2009 by type, end-use, region and for 20 countries. It also evaluates market shares and profiles key producers.
#1347. . . . . . . 11/00. . . . . . . $4,600

Conductive Polymers
Conductive polymer demand in the US will grow over 6% annually. Gains will be sparked by continued electronic products diffusion, greater sensitivity and power of electronic devices and more stringent regulation of electronic noise. Product components will remain the largest market, with ABS and PVC remaining the dominant resins. This study analyzes the $950 million US conductive polymer industry to 2004 and 2009 by resin, function and application. It also evaluates market share and profiles key firms.
#1321. . . . . . . 10/00. . . . . . . $3,600

World Insulated Wire & Cable
Worldwide demand for insulated wire and cable will grow over 5% annually. The best opportunities will come in the largest market, communications and information processing. Growth in wireless communications will benefit wire and cable in applications such as antenna towers and base station transmission units. This study analyzes the $67 billion world insulated wire and cable industry to 2004 and 2009 by type, market, material, region and for 23 countries. It also details market share and profiles key firms.
#1304. . . . . . . 8/00. . . . . . . $4,300

Fuel Cells
US fuel cell markets will rise over fourfold through 2004, with the market reaching $7 billion in 2009. Fuel cells combine atmospheric oxygen with hydrogen or hydrocarbon fuels to produce electrical energy, emitting virtually no pollution. Fuel cells may soon be able to compete with internal combustion engines, gas-fired turbines and storage batteries. This study analyzes the US fuel cell industry to 2004 and 2009 by product/chemistry and application. It also details market share and profiles key companies.
#1275. . . . . . . 5/00. . . . . . . $3,700

OEM Automotive Electronics in North America
The original equipment (OEM) market for auto electronics in the US, Canada and Mexico will grow over 6% per annum. Gains will be fueled by the use of electronics to differentiate vehicle models and markup prices. Navigation and instrumentation will lead gains, with head-up displays, collision avoidance and intelligent air bags also doing well. This study analyzes the North American OEM auto electronics industry to 2004 and 2009 by type and country. It also evaluates market share and profiles key companies.
#1254. . . . . . . 4/00. . . . . . . $3,700

Smart Cards
Smart card demand in the US will grow sevenfold through 2003 to $1.4 billion. Information security and electronic commerce offer the best opportunities. The potentially vast conventional transaction (e.g., debit, credit and stored value card) and payphone card markets will continue to develop slowly as existing magnetic stripe technology works well. This study analyzes the US smart card market to 2003 and 2008 by technology, product and application. It also evaluates market share and profiles key companies.
#1114 . . . . . . . 4/99. . . . . . . $3,500
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Fax: (440) 646-0484

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(no PO Box please)
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Country: ________________________________
Phone: __________________ Fax: __________________
Email: __________________

SHIPPING and HANDLING charges are FREE via UPS (USA only) or airmail (Outside USA). Express delivery available at cost. Please inquire.

K-SM.1322

**TITLE**

#1322 World Electronic Components  $4,500

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[ ] MasterCard
[ ] Visa
[ ] American Express

Credit Card #

MO.               YR.

Expiration Date

Signature: ________________________________