

Appendix B

Glossary of Terms

- Chip:** A small piece (typically less than 1 square centimeter) of a semiconductor wafer. Also used to refer to a packaged integrated circuit.
- Compound semiconductor:** "A semiconductor made of a compound of two or more elements instead of a single element like silicon. II-V semiconductors are made from elements in group 111 of the periodic table (such as aluminum, gallium, and iridium) and group V of the periodic table (such as nitrogen, phosphorus, arsenic, and antimony). Binary compounds are made with two elements, ternaries with three elements, and quaternaries with four elements."
- Custom and semicustom integrated circuits:** ICs that can be designed to varying degrees by the end user for a specific application. Full custom ICs are designed and fabricated from scratch; semicustom chips allow the user to modify a chip for the application.
- Design rule:** Minimum feature size. Current chips typically employ design rules of 1 micron or greater. See table A-1 in app. A.
- Diode:** A two-terminal electronic device that allows current to flow freely in one direction only.
- Gallium arsenide (GaAs):** A compound semiconductor with properties necessary for very high-frequency microwave (analog) devices and optoelectronics. There are also several efforts to make high-speed digital ICs based on gallium arsenide.
- Integrated circuit (IC):** Electronic circuits, including transistors, resistors, capacitors, and their interconnections, fabricated on a single small piece of semiconductor material (chip). Categories of ICs such as LSI and VLSI refer to the level of integration, which denotes the number of transistors on a chip. ICs may be digital (*logic chips*, *memory chips*, or *microprocessors*) or analog. The transistors that ICs are made of may be bipolar transistors, or one of a variety of metal-oxide-semiconductor (MOS) transistors.
- Logic chips:** ICs that manipulate digital data. See app. A.
- LSI:** Large-scale integration. See table A-1 in app. A.
- Memory chips:** Devices for storing information in the form of electronic signals. See app. A.
- Microprocessor:** A computer central processing unit on a single chip. See app. A.
- Micron:** One-millionth of a meter. See fig. A-3 in app. A.
- Microwave circuit:** An analog circuit designed to process high-frequency signals. See app. A and ch. 3.
- MMIC:** Monolithic microwave integrated circuit. See app. A and ch. 3.
- Optoelectronic devices:** Devices that convert light signals to electronic signals and vice versa. See app. A and ch. 3.
- RAM:** Random-access memory. See app. A.
- ROM:** Read-only memory. See app. A.
- Semiconductor:** A crystalline material whose electrical conductivity falls between that of a metal and that of an insulator. Semiconductor materials are used to fabricate virtually all microelectronic devices. Silicon is the most common; others include germanium, gallium arsenide (GaAs), indium phosphide (InP), mercury telluride (HgTe), cadmium telluride (CdTe), and alloys of these compound semiconductors. See fig. 1 in ch. 3 for a periodic table of the elements showing common elements used in semiconductors.
- Substrate:** A piece of material, typically a semiconductor, on which layers of materials are deposited and etched to fabricate a device or a circuit.
- Transistor:** A three-terminal electronic device that can be used to switch or amplify electronic signals.
- VLSI:** Very large-scale integration. See table A-1 in app. A.

¹"Japan Reaches Beyond Silicon," *IEEE Spectrum*, October 1985, p. 46.