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Soft Error in our Life

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Abstract. A soft error was not recognized as a major problem until the 1970s. Now it is confirmed that a soft error is caused by alpha rays radiating. The small cosmic ray-induced neutrons can cause a soft error served as the electric charge contained in memory chip. A memory chip is a type of integrated circuit. It is made with millions of capacitors and transistors, in which a large number of data can be stored. Memory chips hold memory by random access memory (RAM) and read only memory (ROM). To avoid chip damage, the method of reliability analysis is necessary to develop. Reliability of a chip has several methods, e.g. cleanrooms control impurities, process control controls processing and probe and test reduce escapes.

Keywords: Soft Error, Rays Radiating, Memory Chip, Random Access Memory (RAM), Read Only Memory (ROM), Reliability Analysis

Introduction

A soft error is defined as a temporary malfunction occurring with a normal semiconductor and a memory chip, etc. due to certain causes. In place of a hard error, it occurs because of the fatal damages for circuit destruction. It has is no damage in the semiconductor. However, the damage of a soft error occurs in the semiconductor. There, a normal state must be regained by rebooting and rewriting the data in the computer stored in the memory chip. Radiation ray is important issue that can cause a soft error. When radiation ray with particles enters into a semiconductor, then charged particles will be generated within the semiconductor. The charged particles will distort the data contained stored in the memory chip that is a soft error in this chip (Slayman, 2011). A soft error is not recognized as a major problem until the 1970s. Now it is confirmed that a soft error is caused by alpha rays radiating. Such attention has been paid to cosmic ray-induced neutrons, which is as a reason causing a soft error. The small cosmic ray-induced neutrons can cause a soft error served as the electric charge contained in memory chip, and it decreases the advances in microlithography technology. At present, the researcher products featuring the functions to detect and correct errors are available and necessary in the market improving soft errors. In this study, memory chip is the topic.

Memory Chip

A memory chip (Figure 1) is a type of integrated circuit. It is made with millions of capacitors and transistors, in which a large number of data can be stored. Memory chips hold memory by random access memory (RAM) and read only memory (ROM). Read memory is defined as containing permanently stored data, so that a processor can read but cannot modify stored data. Memory chips have different sizes and shapes. Some memory chips are connected with special drives e.g. drives in a satellite for magnetic field records (Lin, 2021). Memory chips are essential components in computer and electronic devices in which memory storage plays an important role.

Figure 1. A memory chip (Taiwan Semiconductor Manufacturing Company, Limited, TSMC, Taiwan)

Memory Chip Reliability

To avoid chip damage, the method of reliability analysis is necessary to develop. Reliability analysis allows researcher to study the nature of measurement scales of chips and the items that make up them. The reliability analysis program calculates the reliability metrics of some commonly used scales, and also provides information about the relationship between individual items in the scale. The correlation coefficient within the group can be used to calculate the reliability estimate between the rankers. Reliability of a chip have several methods e.g. Cleanrooms control impurities, process control controls processing and probe and test reduce escapes (Ueda & Pearton, 2012).

Conclusion

A soft error is not recognized as a major problem until the 1970s. Now it is confirmed that a soft error is caused by alpha rays radiating. Such attention has been paid to cosmic ray-induced neutrons, which is as a reason causing a soft error. The small cosmic ray-induced neutrons can cause a soft error served as the electric charge contained in memory chip, and it decreases the advances in microlithography technology. A memory chip is a type of integrated circuit. It is made with millions of capacitors and transistors, in which a large number of data can be stored. Memory chips hold memory by random access memory (RAM) and read only memory (ROM). To avoid chip damage, the method of reliability analysis is necessary to develop. Reliability analysis allows researcher to study the nature of measurement scales of chips and the items that make up them. Reliability of a chip have several methods e.g. Cleanrooms control impurities, process control controls processing and probe and test reduce escapes.

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Conflicts of Interest

The author declares that there are no conflicts of interest.

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