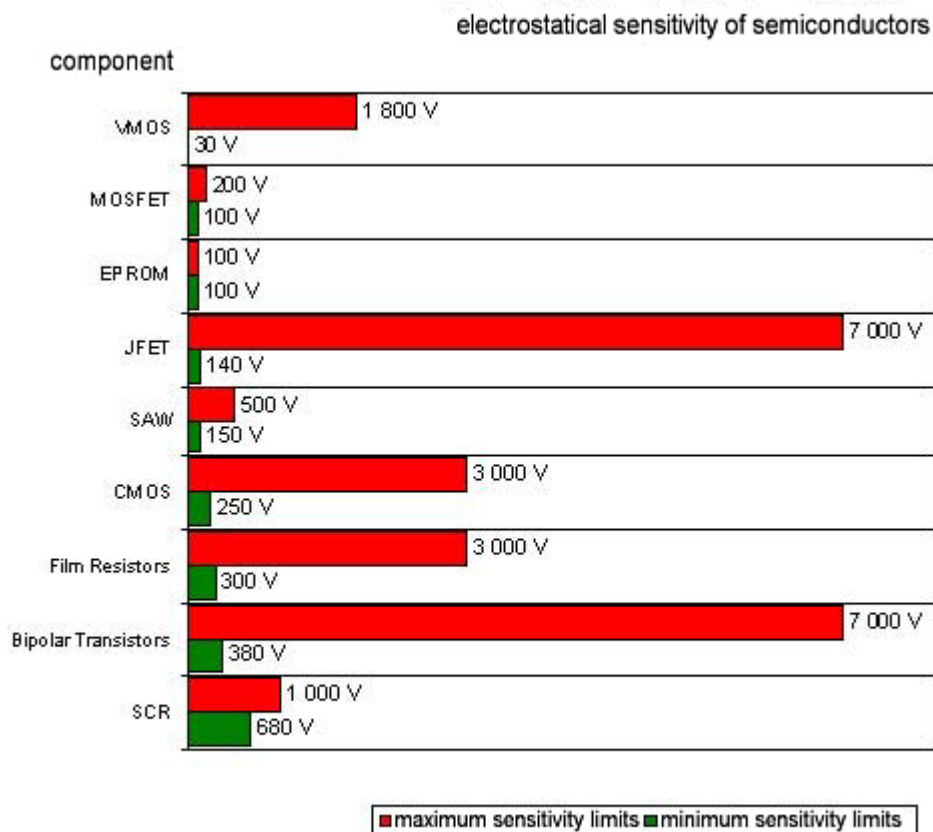


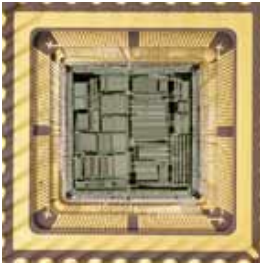
ESD Background



Who hasn't ever gotten a small shock after crossing a carpeted room and then touching a doorknob? Who hasn't experienced the mysterious sparks that light up and zap when you take off a sweater in the dark? These are the smallest of sparks that are caused by the same phenomena that make the summer skies light up in what is commonly called "heat lightning". Experts speak of electrostatic phenomena. Modern technology has taken the oldest known form of electricity and is now using it in all kinds of applications. Electrostatic energy is utilized in photocopying to transfer the ink onto the paper. It is also used in printers to transport even the smallest drop of paint onto the exact spot where it is needed. These are just two of the many positive uses of electrostatic energy in today's world.

But electrostatic energy can have a completely negative effect when it comes in contact with microelectronics, where even a minuscule amount of electrostatic charge can cause huge damage to highly sensitive semi-conductors (see chart).

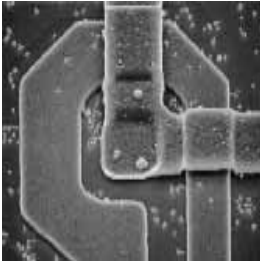




What effect does the ESD (Electro Static Discharge) have on a semiconductor device?

Electronic components are designed for operating with voltages of a few Volts. But electrostatic charge may easily produce voltages of up to several thousand Volts.

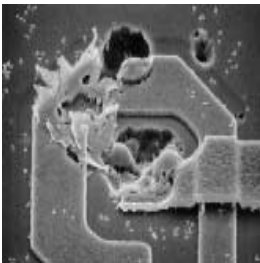
If there is a discharge of such amounts of charge onto conductive objects, then this quick flow of energy may be so powerful that it could cause the conductive paths on a circuit board to melt. High voltages can also break through the oxidation coating on MOS devices. When this happens, it leaves behind a small crater that can cause damage to the circuit. In the simplest of cases the discharge destroys the device.



before an ESD

In even greater number of cases, devices or boards may be minimally damaged, continue to function, and pass the end inspection. But later while in use, the hidden damage begins to affect its performance and sooner or later it either fails partially or breaks down completely. Eventually, this causes significant repair costs. This hidden weakness is sometimes referred to as “walking wounded“ or “latent failure“.

Electrostatic discharge can cause damage in a wide variety of places: devices and components, circuits or even to an entire product! Because charges are most commonly caused by friction, the greatest potential risk factor associated with highly sensitive electronics is human beings!(See diagram)



after an ESD

Each and every damaged component cause costs to rise, costs that are minimal if caught during the quality control at the beginning of the production process. But if a damaged part is allowed to enter the production line and is not discovered until the end inspection after it has already been installed, then the costs have quickly doubled. If this faulty part causes product failure after it has reached the end consumer, then the costs have risen a considerable 10 times.

electrostatic charge produced by people through:

