

# Electrostatic Discharge (ESD) and Damage Prevention

Gregory D. Zoffel, GSP

May 10<sup>th</sup>, 2022



CLASSIFICATION GOES HERE

# Objectives

- > Get to know a little bit about me and EHS at Viasat inc.
- > Learn a little bit about Viasat inc. and who we are.
- > Understand what is electrostatic discharge (ESD) and its effect on microelectronics.
- > Understand different ways to control ESD
- > Learn how we control ESD at Viasat inc.



# About Me

- > Born and Raised in Allison Park, PA
- > Graduated from IUP Bachelors in Safety, Health, and Environmental Applied Sciences (Class of 2020)
- > Completed an Internship with WestRock in Covington, VA (11-months)
- > Started at Viasat in August 2021

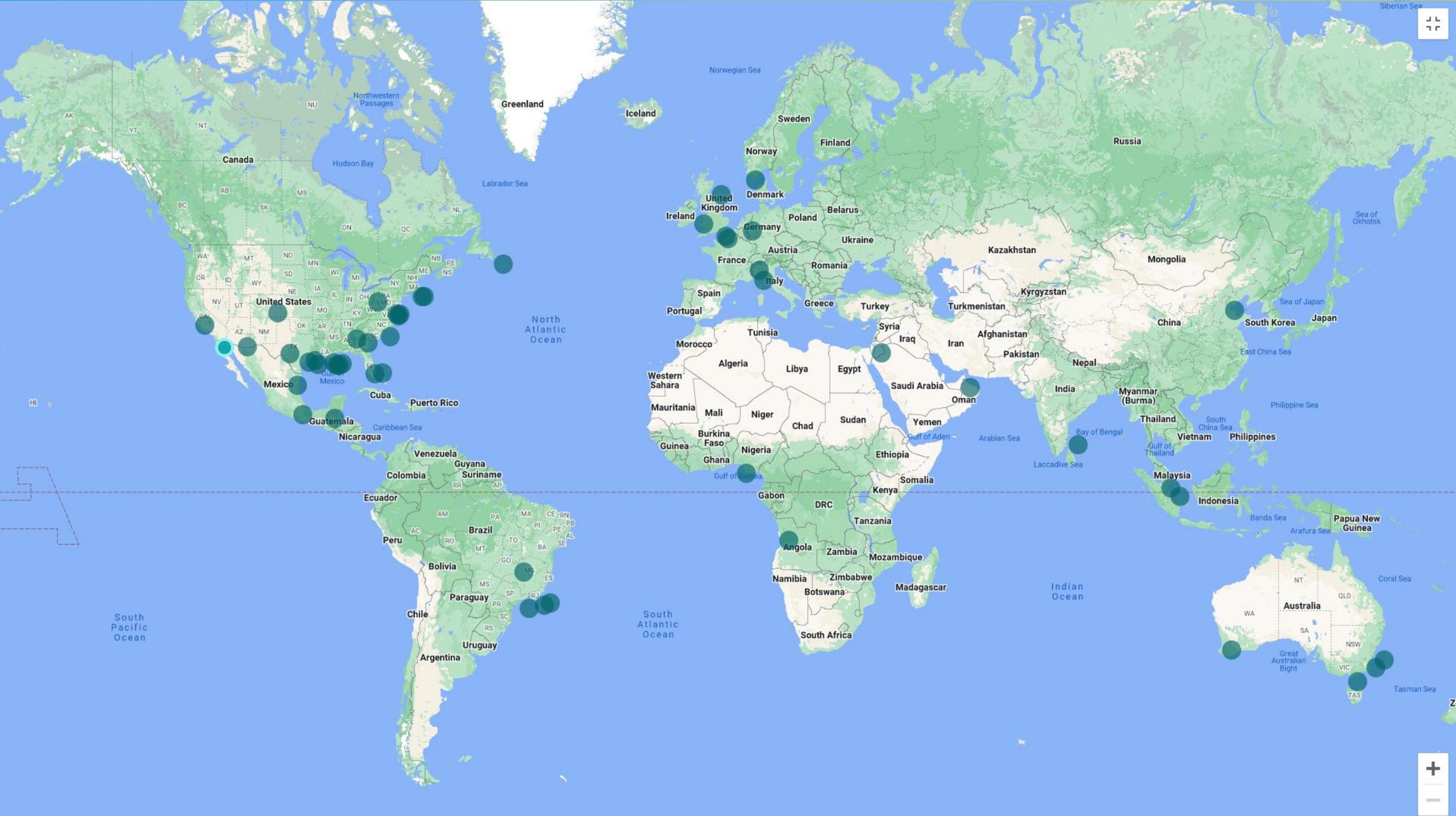




# Who are we?

---

- Global communications company
- We're in the business to connect the world
- Founded in July of 1986 - For more than 30 years we have helped shape the way that businesses, governments, and militaries around the world communicate.
- Goal: Provide world class global communications connecting homes, businesses, governments & militaries with satellite internet and connectivity solutions
- Anyone, anywhere in the world should be able to communicate.
- 50+ locations globally
- 5,800 employees globally



# What do we do?

- Broadband Services
  - Home, small business, and community internet solutions.
- Government Systems
- Commercial Aviation connectivity
  - Electronic Flight Bag
  - In Flight Wi-Fi for Commercial Airlines & Business Jets
- Satellite services
  - Earth Observation + Surveillance
  - Antenna Systems/Products



# EHS at Viasat

- › Our goal is to protect our assets while providing a safe and healthy workplace for our employees, in a green and clean environment.
  - Everyone should have a voice
  - Sharing insight without fear of intimidation or retribution.
    - › Knowledge and skills needed to do their work safely
    - › Awareness and understanding of workplace hazards and how to identify, report, and control them
    - › Specialized training, when work involves unique hazards



# EHS Team – Carlsbad Site

Greg Zoffel



- > EHS Specialist
- > Viasat inc. – Carlsbad, CA

Jim Garman



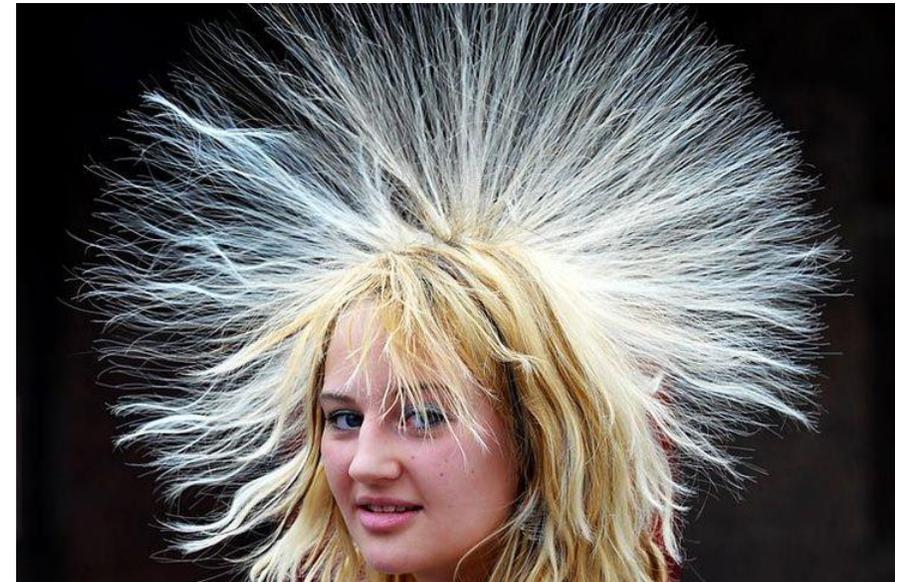
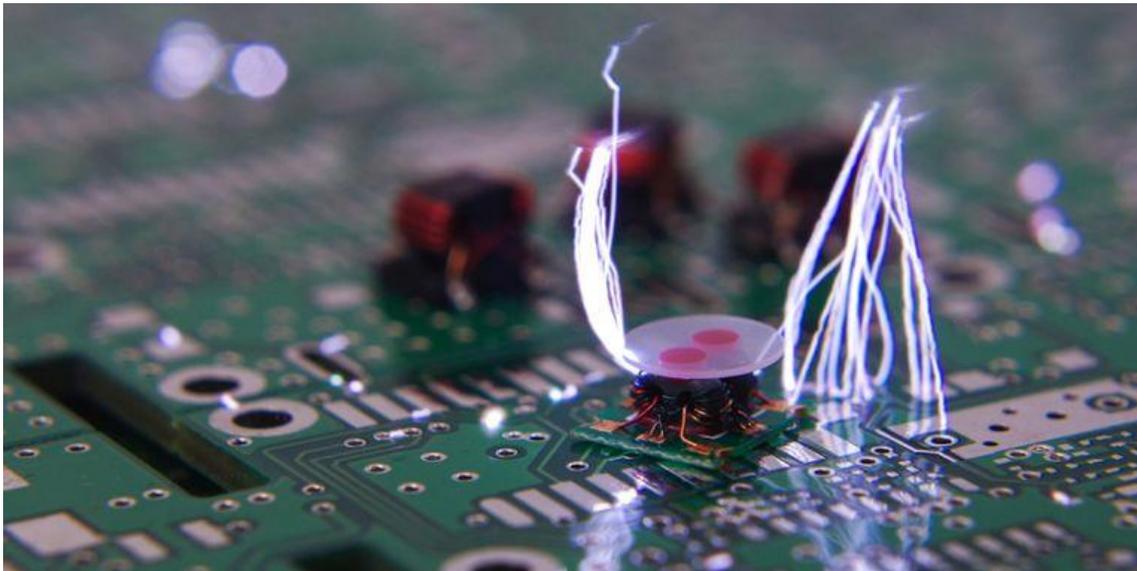
- > EHS Lead
- > Viasat inc. – Carlsbad, CA

# Corporate Headquarters – Carlsbad, CA.



# What is ESD?

- Electrostatic discharge (ESD) is the sudden flow of electricity between two electrically charged objects caused by contact, an electrical short or dielectric breakdown.
  - Static electricity is, in itself, relatively harmless.
  - Discharge created when that electricity moves from one object to another.



# What is ESD?

- > A common example of ESD occurs when walking across a carpet with plastic soled shoes.
- > Electrons are picked up and spread across an entire object or body.
- > A discharge then occurs when contact is made with another conductive body or with ground.



Depending on voltage; this phenomenon may be felt, heard, or seen.

# ESD Sensitive Devices

- > As electronics have undergone miniaturization, they have become more susceptible to ESD.
- > The thin conducting paths in small electronic components are often unable to withstand the voltages associated with ESD.

These devices are known as Electrostatic Discharge Sensitive Devices and are identified by this symbol.



# What is ESD?

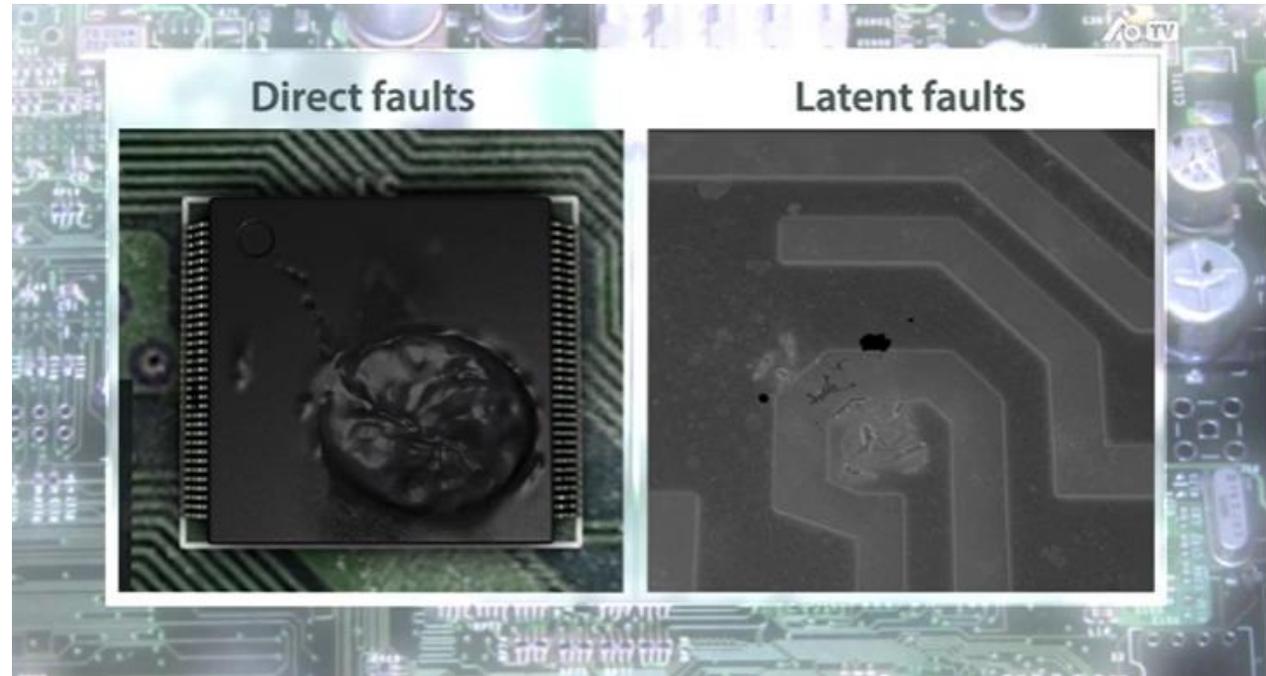
- > It only takes 25 electrostatic volts to irreparably damage an integrated circuit.
- > Voltages of over 10000 V are common across most workplaces.
- > This amount would pose no danger to people, but it could pose a threat to certain electronic devices.



Ex: The surface potential for an average plastic box can be anywhere up to 20000 V.

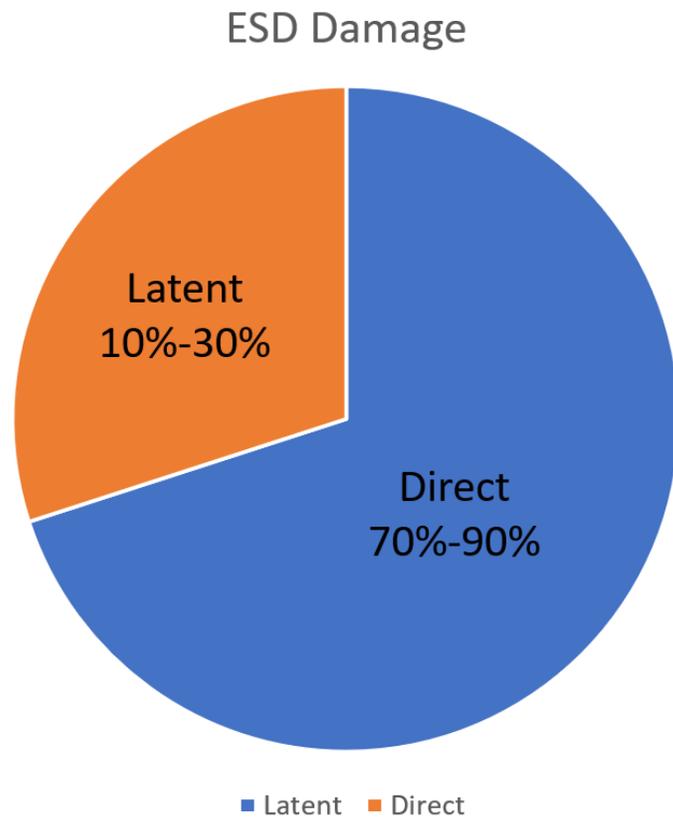
# Direct and Latent Faults

- Depending on the voltage of an ESD, damage may be visible.
- Direct faults – the device is visibly damaged or function is impaired.
- Latent faults – Can not be detected when device is delivered.
  - Only when the device is operational will failures arise.



Note: With latent damage, a device might pass our initial tests but is likely to fail later when it goes to a customer.

# Direct and Latent Faults



# The Bottom Line

- > If damage causes a production line stop, large costs can occur due to servicing and repair work as well as lost production time.
- > ESD damage is not always obvious. some devices may be damaged by discharges as small as 20 volts.
  - The challenge with that?
- > Lives could be on the line!



# ESD Prevention

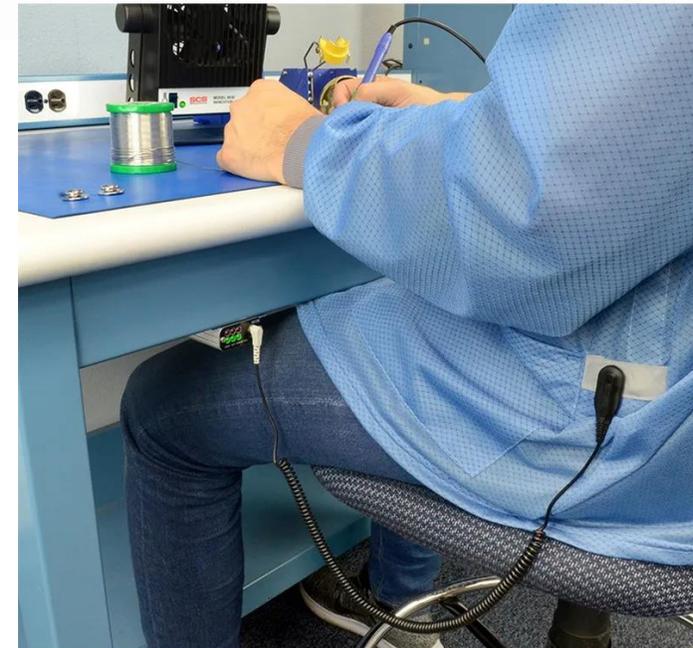
- > Smocks
  - Antistatic
  - Create a Faraday Cage around the wearer
- > Regular clothing can be synthetic and high charging
- > Smocks need grounded? How?
  - > Ground cord connected from smock pocket to ground receptacle
  - > Ground cord connected from wrist strap to ground receptacle

**Note: All ground cords plug into a ground receptacle before handling any product.**



# Smock Care

- › Test your smocks regularly!
  - Utilize a ground continuity tester, using the smock and cord, or wrist strap and cord combination
- › Care for your smocks!
  - If your pockets are stretched or your smock and cord test fails,
    - › Use a wrist strap in place of the smock pocket until the smock can be replaced.
    - › Just snap your grounding cord to your wrist strap instead of the smock pocket!

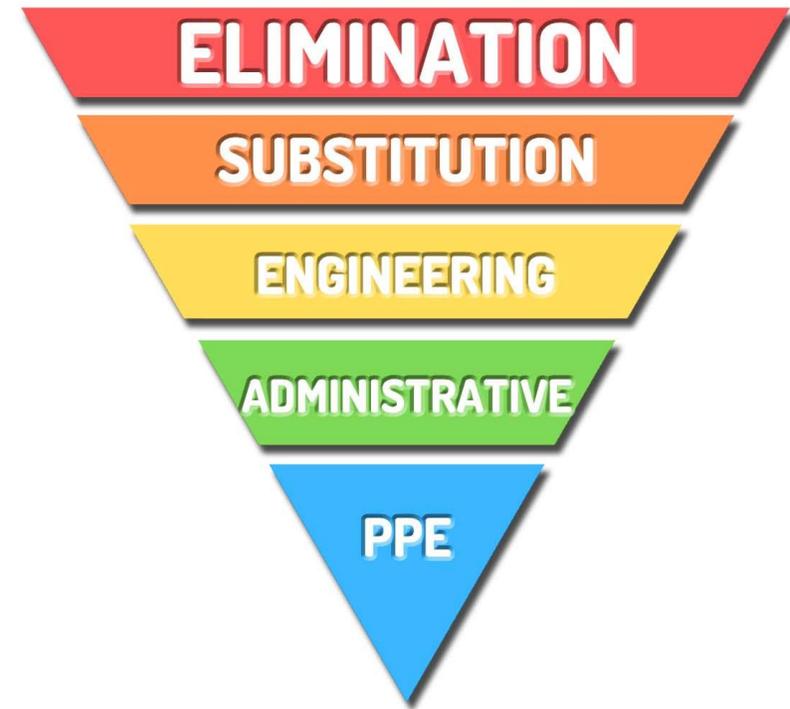


# ESD Sensitive Areas

- > Smocks required!
- > Areas identified using yellow identifying tape.

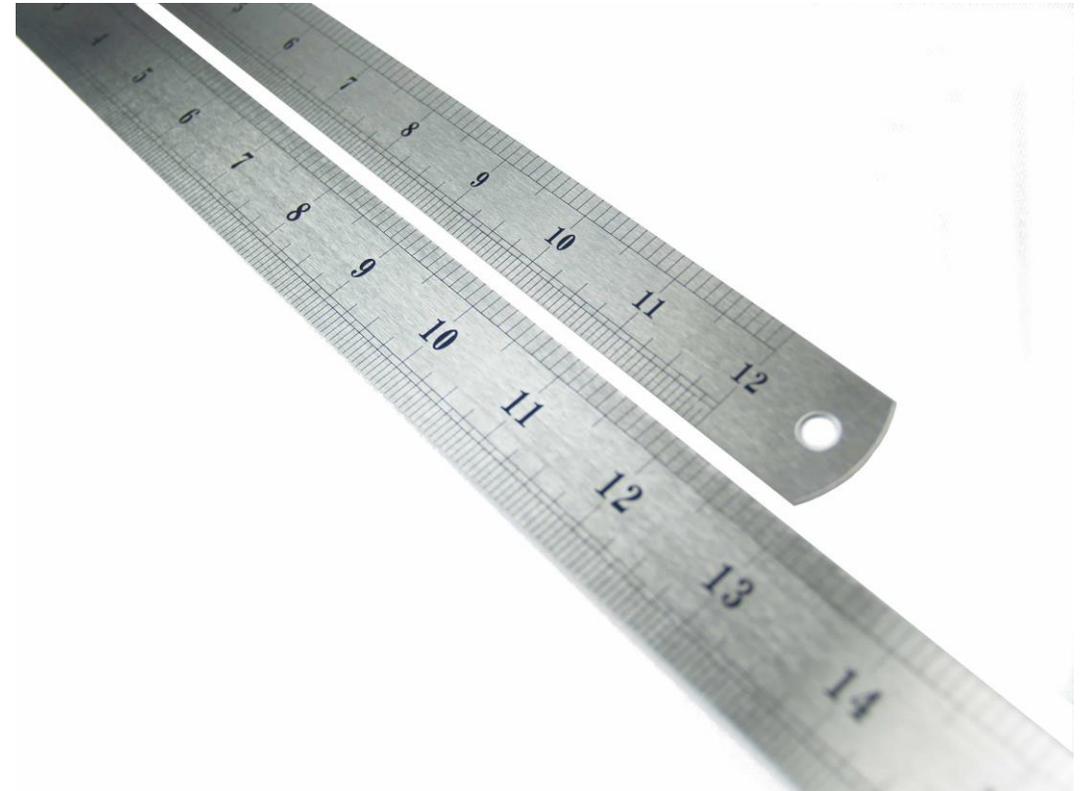


## HIERARCHY OF HAZARD CONTROLS



# 12 Inch Rule and 6 Foot Rule

- > 12-Inch Rule: Static generating materials must be kept at least 12” away from static sensitive devices and assemblies to prevent against potential ESD damage
  
- > 6 Foot Rule: There are times where employees will need to work in ESD sensitive areas.
  - If work is performed a sufficient distance (6 Feet or more) away from our products, a smock is not required.



# Anti-Static Workbenches

- > Antistatic laminate top
- > Built in ground receptacle transfers static to ground.
- > Vinyl or Rubber mat



# Other Measures

- ESD safe chemical containers
- Precautions when moving lab workbenches:
  - Measurements are taken to ensure grounding capabilities



# Final Takeaways

- > Get to know a little bit about me and EHS at Viasat inc.
- > Learn a little bit about Viasat inc. and who we are.
- > Understand what is electrostatic discharge (ESD) and its effect on microelectronics.
- > Understand different ways to control ESD
- > Learn how we control ESD at Viasat inc.



# Questions?

# Contact Information

- > Gregory Zoffel
- > Email: [Gregory.Zoffel@viasat.com](mailto:Gregory.Zoffel@viasat.com)
- > Phone #: (442) 357-0303

- > Jim Garman
- > Email: [Jim.Garman@viasat.com](mailto:Jim.Garman@viasat.com)
- > Phone #: (442) 357-0399