

ESD BASICS

Part 1 ELECTROSTATICS – Basics

Development of electrostatic charges

- Classical electrostatic
- Mechanism:
 - ➡ tribo-electricity and influence
- Processes at the charge and discharge of persons
- Influence of the environment conditions

Part 2 Definitions (ESD vocabulary)

Part 3 Effects of electrostatic charges

General discharge models

- HBM Human Body Model (IEC 61340-3-1)
- MM Machine Model (IEC 61340-3-2)
- CDM Charge Device Model
- FIM Field Induced Model

General fault mechanism of electronic devices and assemblies

- Thermal rupture
- Di-electrical rupture
- Melting of the metallization

Part 4 Precautions, general requirements

- Integrated protect switches
- Technological precautions
- Organizational steps
 - Configuration of ESD workstations, ESD areas
 - Behavior of the employees in the ESD areas
 - ESD control program plan

Part 5 Voltage and energy susceptible devices and assemblies

- Effects of electrostatic discharges of MOS and bi-polar assemblies
- Multiple ESD - faults - overlaying of faults
- Latently faults and degradation

Part 5.1 ESD On-Chip protection, IEC 61340-3-1 and 3-2 as well as CDM and FIM assemblies and PCBs and devices

Part 5.2 System level ESD/EMC (IEC 61000-4-2)

Part 5.3 ESD fault models and mechanism

Part 5.4 Models and measurements

Analysis – Trainings – Qualifications – Audits

Part 6 Comparison of the discharge models

- HBM Human Body Model (IEC 61340-3-1)
- MM Machine Model (IEC 61340-3-2)
- CDM Charge Device Model (Standard draft)
- FIM Field Induced Model (?)

Part 7 Calculation of electrostatic magnitudes (introduction)

ESD MEASUREMENTS

Measurement of electrostatic parameters:

- Electrostatic charges
- Electrical fields
- Surface resistance and resistance to ground
- Evaluation of the measurement results and experiences at the measurement of the parameters

Measurement methods according to the standards

- Measurement of electrostatic parameters:
 - Resistance measurements: surface resistance and resistance to ground
 - Measurement of the charge and the electrostatic field
 - Experiences at the measurement of electrostatic parameters

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ESD STANDARDS

Part 1 Stand and tendencies at the ESD - standards

- IEC 61340-5-1 and IEC 61340-5-2 overview
- Passage of DIN EN 100015 to IEC 61340-5-1 Ed. 1 (2007-08)
- American standards: ANSI/ESD S20.20-2007, JEDEC ANSI/EIA-625A and handbooks (EOS/ESD ADV 2.0)

Part 2 IEC 61340-5-1 + IEC 61340-5-2 overview

- Area of application
- Fundamental terms, definitions
- ESD precautions

EPA + ESD areas

- ESD precautions at the design of ESDS
- Marker of ESDS and ESD areas (EPAs)
- Parts of an EPA, requirements to the equipments
- Working in the field, service workstations
- Requirements to means of transportation and packaging
- Trainings
- Quality responsibility of the management, of the employees, of the ESD Coordinators
- Regularly tests, controls, audits

Part 3 Measurement methods according to the standards

- Measurement of electrostatic parameters:
 - Resistance measurements: surface resistance and resistance to ground
 - Measurement of the charge and the electrostatic field
 - Experiences at the measurement of electrostatic parameters

Part 4 Practical precautions (ESD control systems)

Analysis – Trainings – Qualifications – Audits