



# March 2024 Standards Summary Session



- For more information on the Standards Business Unit and the standards development process, please visit <https://www.esda.org/standards/standards-working-groups/#references> > Standards Development Presentation
- A copy of these slides will be posted on our website <https://www.esda.org/standards/standards-working-groups/#references> > Standards Activity Summaries
- For more information on recent WG activities, please visit <https://www.esda.org/standards/standards-working-groups> > Committees Drop Down Menu

## WG 1 – Wrist Straps

Currently published documents

- ANSI/ESD S1.1-2021 Wrist Straps
- TR1.0-01 Survey of Wrist Strap Continuous Monitors

Summary of discussions/activities/document reviews during the most recent WG meeting.

- Working on updating the Technical Report to include new technologies and to expand on descriptions of current technologies

## WG 2 – Garments

Currently published documents

- ANSI/ESD STM2.1-2018 Garments

Summary of discussions/activities/document reviews during the most recent WG meeting.

- 5-year review of STM2.1.
  - Removing compliance verification from the document (should be in TR53).
  - Removing hanging clips from the document as a qualification procedure.
  - Need to add method for evaluating knit cuffs on Groundable Garment category. Reviewing data collection charts ensure that they match with procedures.
  - Need to include equipment verification procedures to verify shielding leads.
  - Need to update or improve photos/images.

## WG 3 – Ionization

### Currently published documents

- ANSI/ESD STM3.1-2015 “Ionization”
- ANSI/ESD SP3.3-2016 “Periodic Verification of Air Ionizers”
- ANSI/ESD SP3.4-2016 “Periodic Verification of Air Ionizer Performance Using a Small Test Fixture”
- ANSI/ESD SP3.5-2020 “Test Methods for Air Assist Bar Ionizer, Soft X-Ray (Photon) Ionizers, Alternative Room Ionization, and Non-Airflow Alpha Ionizers”
- ESD TR3.0-01-02 “Alternate Techniques for Measuring Ionizer Offset Voltage and Discharge Time”
- ESD TR3.0-02-05 “Selection and Acceptance of Air Ionizers”

### Summary of discussions/activities/document reviews during the most recent WG meeting.

- The proposed plan to re-write STM3.1 removing ionization systems that are not compatible with a repeatable & reproducible test method was reviewed and agreed upon by the committee.
- A rough draft of the proposed document was reviewed, and many comments covered. Some other major changes were proposed by members.
- SP 3.3 & 3.4 need to be reviewed and compared to TR53 and a decision made on if these can be withdrawn or not.
- **WG chair to do the SP review and also clean up STM3.1 and send to the members.**

## WG 4 - Worksurfaces

### Currently published documents

- ANSI/ESD STM4.1-2017 Worksurfaces Resistance Measurements (Including Shelving and Mobile Equipment)
- ESD TR4.0-01-02 ESD Association Technical Report - Survey of Worksurfaces and Grounding Mechanisms

### Summary of discussions/activities/document reviews during the most recent WG meeting.

- 5-year review of ANSI/ESD STM4.1 – WG in process of reviewing the document and updating.

## WG 5 – Device Testing

Currently published documents

- ANSI/ESD SP5.0-2023

Summary of discussions/activities/document reviews during the most recent WG meeting.

- The WG was considering changing both the ANSI/ESDA/JEDEC JS-001/JS-002 documents to allow the reuse of HBM stressed units in CDM testing and CDM stressed units in HBM testing. The use of step stressing was also discussed.
- The decision is to use common wording that indicates you *should* use new units at each voltage level – but step stressing is allowed. The wording will also include a caution about being aware of stress hardening and/or cumulative stress risks if choosing to reuse units and/or step stressing.
- Similar wording will be used in both specs
- A Virtual meeting of the members will be held to finalize the wording and the text that must be changed/removed in each spec will also be agreed to.

# JWG HBM – Human Body Model Device Testing

Currently published documents ([www.esda.org](http://www.esda.org))

- ANSI/ESDA/JEDEC JS-001 – HBM Device Testing
- ANSI/ESD SP5.1.3-2022 – Method of randomly Selecting Pin Pairs
- ESDA/JEDEC JTR001-01-12 – HBM User Guide

Summary of discussions/activities/document reviews during the most recent WG meeting.

- Status of JS-001 Limited Ballot
- STDCOM comments on WIP5.1.4-2023 – Method of randomly sampling PWR pins
- JTR001 – User Guide Updates
- Cloned IO modification discussion
- Walk In- Pin Grouping criteria inconsistencies: Can it be simplified?

# CDM JWG – Charged Device Model

## Currently published documents

- ANSI/ESDA/JEDEC JS-002-2022 – Joint Standard - Charged Device Model (CDM) – Device Level
- ESDA/JEDEC Joint Technical Report - JTR002-01 CDM User Guide
- ANSI/ESD SP5.3.1 – Contact CDM (50 ohm)
- ANSI/ESD SP5.3.3 – Low Impedance Contact CDM (LICCDM)
- CC-TLP SP5.3.4-2022 – Capacitively Coupled Transmission Line Pulsing as an Alternative CDM Characterization Method
- ESD TR 5.3.1-01-18 - Contact Charged Device Model (CCDM) Versus Field Induced CDM (FICDM) A Case Study

## Summary of discussions/activities/document reviews during the most recent WG meeting

- JWG consideration of remaining unadjudicated TAS comments for JTR002 CDM User Guide Revision
- CC-TLP next steps - Infineon presentation / Round Robin data gathering discussion
- Bare Die CDM Testing TR document draft - next steps discussion prior to JWG review
- 3-zap (AEC) vs. 1-zap (non-auto) CDM zaps per pin per polarity – review of draft presentation for April 2024 AEC Reliability Workshop

## WG 5.5 – Transmission Line Pulse (TLP)

### Currently published documents

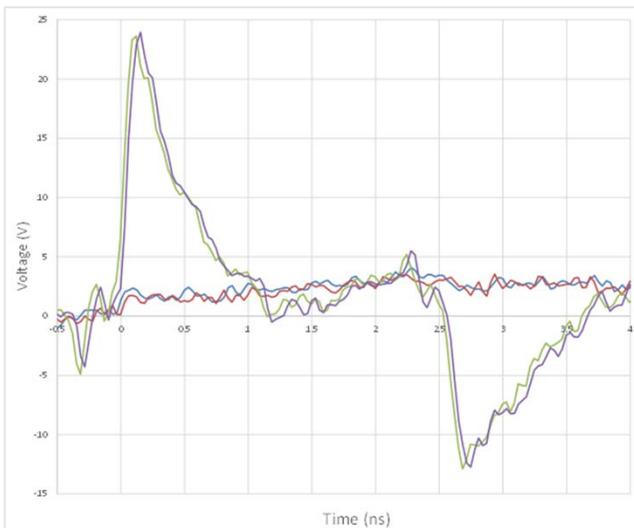
- ANSI/ESD STM5.5.1-2022, the standard test method for (VF-)TLP
- ESDTR5.5-04-23, the user and application guide for (VF-)TLP
- ESDTR5.5-05-20, technical report on transient analysis with TLP
- 3 older technical reports

### Current focus

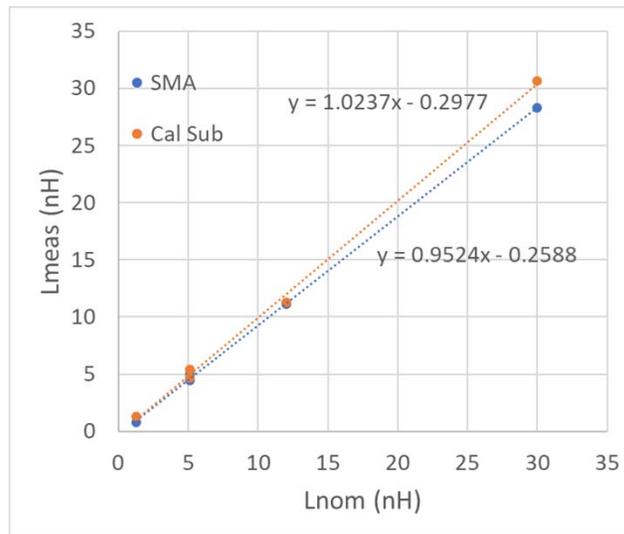
- Working on SP for use of VF-TLP for transient response analysis
  - Question: do we need additional calibration on top of the standard quasi static calibration?
  - Collecting data using measurements on L and C DUT with different VF-TLP set-ups
- Working on TR on statistical applications of TLP methods
  - Draft document is ongoing
  - Collecting data on variability intrinsic to the set-up(s) and examples of use on real DUTs
  - Discussing on methods to automatically extract key TLP parameters ( $V_{t1}$ ,  $I_{t2}$ ,  $V_h$ ,  $R_{on}$ , etc.)
  - Exploring the possibility to use Machine Learning
- Above 2 topics are addressed by 2 separate writing teams
- Example results on next slide

# WG 5.5 – TLP - Examples

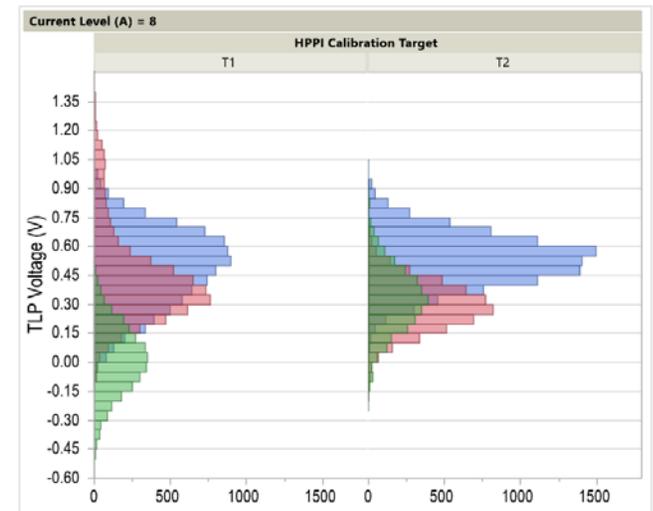
- Kathy Muhonen (Qorvo)
- Transient voltage response on 1 nF with 2.5 ns pulse with 100 ps rise time with 4 different probe configurations



- Theo Smedes (NXP)
- LCR measurement of possible calibration DUTs mounted on SMA and probed on substrate



- Leonardo Di Biccari (STm)
- TLP voltage distribution of 1000's repeated pulses on 2 shorts with 3 different oscilloscopes



## WG 5.6 – Human Metal Model (HMM)

### Currently published documents

- ESD TR5.6-01-09 Human Metal Model – A technical report (TR) describing the motivation for writing ESD SP5.6
- ESD SP5.6-2019 Human Metal Model – A standard practice (SP) describing a best practice for stressing components with IEC 61000-4-2 waveform

### Summary of discussions/activities/document reviews during the most recent WG meeting.

- Reviewed status of TR5.6-02-2x
  - TR describing what has been learned using SP5.6
  - Out for TAS review
  - Additional comments from David Pommerenke – will supplement the document after the first TAS review
- Should WG5.6 write SP on 50 ohm HMM pulse sources only?
  - Lively discussion
  - Might be the technically correct way to go
  - Chance of industry adoption is low
  - **Maybe** consider after Industry Council work on System Level - Direct Pin ESD

## WG 7 - Flooring

Currently published documents

- ANSI/ESD STM7.1-2020 – Flooring Systems – Resistive Characterization
- ESD TR7.0-01-23 – Protective Flooring Systems

Summary of discussions/activities/document reviews during the most recent WG meeting.

- WG 7 is developing a training module based on the contents of TR7.0. All the slides are finalized and the script has been drafted. We did a complete run through of the module to finalize any comments on the slides and script. The run through took the entire meeting, so comments are being taken off line and will be incorporated in the final module. The module will be submitted to the Education Committee within the next month.

## WG 11 - Packaging

### Currently published documents

- ESD ADV11.2-1995 – Triboelectrification
- ANSI/ESD STM11.11-2022 – Surface Resistance
- ANSI/ESD STM11.12-2021 – Volume Resistance
- ANSI/ESD STM11.13-2021 – Two Point Probe
- ANSI/ESD STM11.31-2018 – Discharge Shielding
- ANSI/ESD S541-2019 – Packaging
- ANSI/ESD S11.4-2022 - Bags

### Summary of discussions/activities/document reviews during the most recent WG meeting.

- 5-year review of STM11.31 – Moved to TAS
- 5-year Review of S541 – WG Approval pending – then move to TAS
- Open ADV11.2 for discussion and review – possibly convert to SP
- Terminate Task Teams for inclined plane and box shielding tests

## WG 12 – Seating

Currently published documents:

- ANSI/ESD STM12.1-2019 “Seating – Resistance Measurements”

Summary of discussions/activities/document reviews during the most recent WG meeting:

- WG reviewed and adjudicated comments on ANSI/ESD STM12.1 from final WG review
- With one minor change after discussion in Manufacturing Task Team, ANSI/ESD STM12.1 is ready for submission to TAS
- Currently no intention to address other seating-related topics, such as system test with person seated

## WG 13 – Hand Tools

### Currently published documents

- ANSI/ESD S13.1-2019 Electrical Soldering/Desoldering Hand Tools
- ESD TR13.0-01-99

### Summary of discussions/activities/document reviews during the most recent WG meeting.

- S13.1 – Reviewed the need to update this document now that it is in the 5year review. This document needs to take precedence over the work on TR13.0.
  - Add Verification section
  - Align verification and point to TR53
  - Wording updates
  - Review need to keep this document as a S, or remove limits (already in S20.20) and move the document to a STM
- TR13.0 – Discussed continued work and updating for the document. Specifically, the need to update it with two test methods. No updates were done on the document shared at the meeting. It was the opinion of the working group that there was a different, more updated document.
  1. Point-to-Point teste capturing the concern of conductive contact point with ESDS item.
  2. System level test capturing the concern of charged person causing an injection of charge into the ESDS item.
  3. A guest in the meeting brought up the need to consider noise on ground as an EOS possibility. Information has been sent and will be reviewed.

## WG 14 – System Level ESD

### Currently published documents

- ESD TR14.0-01-00 - Calculation of Uncertainty Associated With Measurement of Electrostatic Discharge (ESD) Current (Formally TR-07-00)
- ESD TR14.0-02-13 - System Level Electrostatic Discharge (ESD) Simulator Verification (Formally ANSI/ESD SP14.1)
- ANSI/ESD SP14.5-2021 - Near Field Immunity Scanning - Component/Module/PCB Level (EMC/ESD Scanning)

### Meeting focused on a proposed Direct Pin Injection test method

- Although the IEC61000-4-2 standard states that this method should not be used directly on connector pins, device manufacturers are being asked to provide test levels on external connection pins
- Discussing Direct Pin Injection testing, brings up the question as to whether CDE (Cable Discharge Event) are simply just another stimulus type of Direct Pin Injection testing?

### Industry Council Survey on Direct Pin Injection testing

- To drive this testing method further the Industry Council is creating a survey to gather additional information on the testing requirement.
- The WG reviewed the survey questions and were asked to provide additional comments which will be provided back to the council.

## WG 15 – Gloves

### Currently published documents

- ANSI/ESD STM15.1-2019

### Summary of discussions/activities/document reviews during the most recent WG meeting.

- The WG spent the hour focused on the 5-year review of ANSI/ESD STM 15.1.
- Good progress and planning a virtual call with members between meeting series to continue with the objective of completing the review in the June meeting series.

## WG 17 – Process Assessment

Currently published documents:

- ANSI/ESD SP17.1-2020, “Process Assessment Techniques”
- ANSI/ESD SP10.1-2016, “Automated Handling Equipment (AHE)”
- ESD TR17.0-01-15, “For ESD Process Assessment Methodologies in Electronic Production Lines – Best Practices Used in Industry”

Summary of discussions/activities/document reviews during the most recent WG meeting:

- WG reviewed and adjudicated comments on ANSI/ESD STM17.1 Revision 2 from WG review, ANSI/ESD STM17.1 is now ready for submission to TAS
- Continued work on introduction slide set “How to use ANSI/ESD SP17.1” and Technical Report “ESD Event Detection”
- Purpose, scope, and contents of ANSI/ESD SP17.2 “Process Assessment of Electrical Disturbances” under discussion; overlap to SEMI E176 in assessment
- Technical Report on Application of ANSI/ESD SP17.1, including die-to-die processes, will start after submission of ANSI/ESD SP17.1 to TAS

## WG 18 - EDA

Currently published documents:

- ESD TR18.0-01-14 ESDA Technical Report for ESD Electronic Design Automation Checks
- ESD TR18.0-02-20 ESDA Technical Report for Latch-Up Electronic Design Automation

Bi-weekly virtual meetings

Currently WG18 has been working on:

- New version of ESD TR18.0-01 – main activity for WG18.
  - Planned to submit a new version to TAS by August 2024
- Extension of EDA contacts list

## WG 18 – EDA – ONGOING ACTIVITIES

- New ESD TR18.0-01 version covers all verification types
  - Schematic-based static topological
  - Layout-based
  - Package
  - Plus investigation on the entire verification FLOW
  - System
  - Spice
  - TCAD
- Finalized schematic & layout-based checks chapters
- Under finalization FLOW chapter
  - Completed alignment of FLOW section with all the other sections
  - Completed description of performances and needed information for each verification type
- Under finalization Package chapters
- Last edits to be performed on System/Spice/TCAD chapters
- WG worked on extending ESDA EDA vendors contacts list to reach a broader audience and facilitate relationships during ESDA events

## WG 19 – High Reliability

Currently published documents

- ESD TR19.0-01-22 - released earlier and the working group went dormant.

Summary of discussions/activities/document reviews during the most recent WG meeting.

- The working group has been reactivated to write a standard practice for high-reliability
- The concept of a standard practice and how it differs from a TR (technical report) was discussed.
- The working group worked on completing the Statement of Work (Form 3).
- Discussions were held to understand what might be included and even why the standard practice is needed.
- Plans were made for virtual meetings to ensure that the work on this document is ongoing in a timely manner.

## WG 27 – Automotive EOS

### Currently published documents

- ANSI/ESD SP27.1-2018 For the Recommended Information Flow for Potential EOS Issues between Automotive OEM, Tier 1, and Semiconductor Manufacturers.

### Summary of discussions/activities/document reviews during the most recent WG meeting.

- Alignment on direction of SP27.1.
  - Reaffirm current revision due to bandwidth constraints.
  - Begin work on draft revision of SP27.1 to better harmonize with VDA equivalent (i.e., simplify to two levels).
  - Reach out to ESDA Automotive Committee to engage with industry, specifically USCAR, for re-engagement on SP27.1 direction and approval – or we will remove them from the document.
- WIP TR27.1 update and request for support to complete the document.

## WG 28 – Electrostatic Attraction

Currently published documents

- Nothing is currently published

Summary of discussions/activities/document reviews during the most recent WG meeting.

- The working group reviewed some of the changes made to the document
- Agreed to move some major sections around and insert the new drawings
- WG chair will find replacement figures that are needed, reformat the document, and send out to the working group members for review before submission to TAS.

## WG 29 - Healthcare

Currently published documents

- None

Summary of discussions/activities/document reviews during the most recent WG meeting.

- Adjudicated Latest Round of TAS comments on TR29 – Guidance for Control of Electrostatic Hazards in Healthcare Facilities – Document will be updated based on adjudication and resubmitted to TAS. Hoping to have published before September.

## WG 97 – Footwear/Flooring

### Currently published documents

- ANSI/ESD STM97.1-2015 - Footwear/Flooring System – Resistance Measurement in Combination with a Person
- ANSI/ESD STM97.2-2016 - Footwear/Flooring System – Voltage Measurement in Combination with a Person

### Summary of discussions/activities/document reviews during the most recent WG meeting.

- Completed adjudication of the STDCOM comments on STM97.1.
- One of the Technical comments that was part of a “No” vote was regarding the testing of new footwear and the sample size. This was not clear in this document. The sample size for new footwear and the test procedure will be added to Section 5.3 Installed or Applied Material, which is for “new floor mats or newly installed floors.” It will be rewritten into three sections.

# Manufacturing Task Team

Currently published documents

- None

Summary of discussions/activities/document reviews during the most recent WG meeting.

- Standardization Reminders (Troubleshooting, Acceptance Testing, and Compliance / Period Verification does not belong in STMs; STMs to have Equipment Verification Procedures in Annex; Minimum Reporting Requirements to be used)
- STM Should vs. Shall (Avoid use of should statements where possible as they lead to ambiguity and subjectivity in methods; requirements, incl. boilerplate statements, to be 'shall' statements – identified ambiguity in development of product qualification laboratory certification.)