

# ES640 Charged Device Model (CDM) Test System



*(Chamber, Enclosure and Software GUI maybe updated without notice)*

## 1. Introduction

Charged Device Model (CDM) electrostatic discharge is a common cause of microelectronic circuit failure. Sensitive devices can be seriously damaged or destroyed by a CDM discharge at relatively low voltage. This often occurs when the static charged device contacts a metal surface at a different potential. Such an electrostatic discharge often has an extremely fast rise time.

The Model ES640 Charged Device Model (CDM) Test System is a robotic CDM test system designed to meet all popular CDM test methods, allowing both field induced air discharge methods (FICDM) and contact first (CCDM) methods. The system includes a computer, environment-controlled chamber, precision XYZ motion system, different types of CDM test setups, and an automated test and data analysis software.

## 2. Features

- High resolution cameras (up to 3) allow for easy pin alignment operation
- High resolution motion control system (down to below 1  $\mu\text{m}$  step)
- Allows multiple devices being tested in a batch
- Patent-pending CCDM method allows better repeatability
- Airtight environment chamber increases drying unit efficiency
- Support regenerative drying unit (lower cost than nitrogen)

## 3. Applications

- General charged device model (CDM) system for package and wafer level tests
- Support many popular latest CDM methods:
  - ✓ ANSI/ESDA/JEDEC JS-002 (FICDM)
  - ✓ AEC Q100-011 Rev-D (2019 Ver. follows JS-002)
  - ✓ AEC Q101-005 Rev-A (2019 Ver. follows JS-002)
  - ✓ ANSI/ESD SP5.3.3 (LI-CCDM, VF-TLP required)
  - ✓ CC-TLP (ESDA SP pending, VF-TLP required)
  - ✓ Patent pending RP-CCDM method
  - ✓ Legacy and customized solutions available upon request
- Customizable dimension for robotic CBM (Charged Board Model) and flat panel tests

## 4. Specifications

| Parameters                 | ES640-150             | ES640-300   | Units | Comments                      |
|----------------------------|-----------------------|-------------|-------|-------------------------------|
| Max XY Motion Area         | ≥ 150 X 150           | ≥ 300 X 300 | mm    | Probe motion area             |
| Max DUT Area               | 160 X 160             | 375 X 425   | mm    | MAX Field plate area for DUT  |
| Field Plate Area           | 210 X 210             | 395 X 470   | mm    | Field plate area              |
| Max Z Travel Distance      | ≥ 50                  |             | mm    | Customizable                  |
| Min X, Y, Z Step Size      | 100                   |             | nm    |                               |
| Reposition Repeatability   | ≤ ±6                  |             | μm    |                               |
| Voltage Range              | ± 1 to ±2000 or ±4000 |             | V     | Default 2000V, customizable   |
| Min Voltage Step           | 1                     |             | V     |                               |
| Voltage Accuracy           | ± 1% ± 0.1V           |             | % V   |                               |
| XY Vision Resolution       | 1920 X 1080           |             | Pixel | Zoom & Pan                    |
| Vertical Vision Resolution | 2592 X 1944           |             | Pixel | Zoom & Pan                    |
| Operating Temperature      | 10 to 40              |             | (°C)  |                               |
| Operating Humidity         | 0 to 80               |             | %     |                               |
| Power Supply               | 120-240 VAC, 50/60 Hz |             | VAC   |                               |
| Power Consumption          | 300                   |             | W     |                               |
| N2 or CDA Pressure         | 10 - 120              |             | PSI   |                               |
| N2 or CDA Peak Usage       | 0.2 cfm or 0.34 m3h   |             |       |                               |
| 300 N2 Tank Avg Usage      | ~ 19                  |             | hour  | Continuous @ 40RH environment |
| Desiccant Avg Usage        | ~ 24                  |             | hour  | Continuous @ 40RH environment |

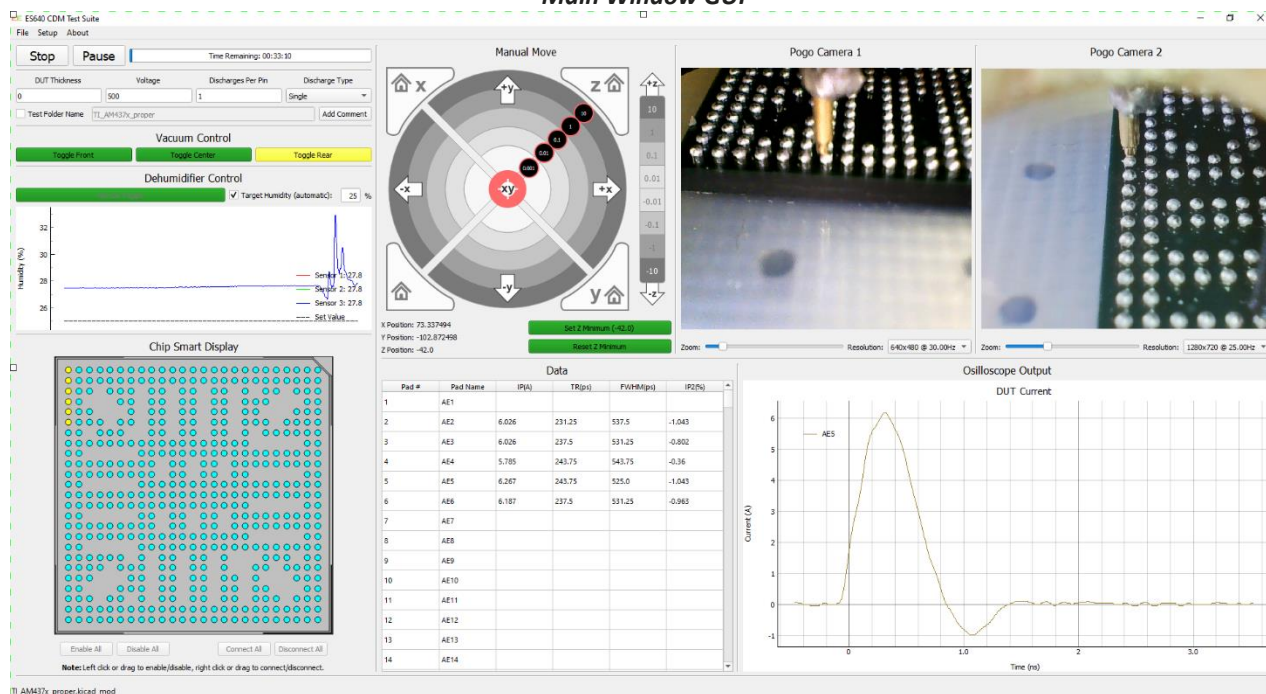
## 5. Ordering Information

| Line                                                                                                                      | Part # or Option # | Description                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ES640 Charged Device Model (CDM) Test System</b>                                                                       |                    |                                                                                                                                                       |
| 1.1                                                                                                                       | ES640-150          | Standard CDM platform, 150 X 150 mm Test Area, 2 kV                                                                                                   |
| 1.2                                                                                                                       | ES640-300          | Large CDM platform, 300 X 300 mm Test Area, 2 kV                                                                                                      |
| 1.3                                                                                                                       | ES640-HC           | Humidity Conditioning Unit (no Nitrogen needed), with desiccant tube *2<br>(Uses reusable desiccants, lower cost of usage than N <sup>2</sup> or CDA) |
| 1.4                                                                                                                       | ES640-CV4          | Charge Voltage Upgrade from 2kV to 4 kV                                                                                                               |
| <b>ANSI/ESDA/JEDEC JS-002 Standard Related Test Solution</b><br>(Followed standards include AEC_Q100-011D, AEC_Q101-005A) |                    |                                                                                                                                                       |
| 2.1                                                                                                                       | ES640-JS002        | JS-002 Solution – System Integration Package<br>(Including One ES640-JS002-1 Test Fixture)                                                            |
| 2.2                                                                                                                       | ES640-JS002-C      | JS002/C101 Calibration Disc (6.8 pF and 55 pF)                                                                                                        |
| 2.3                                                                                                                       | ES640-JS002-1      | JS-002 Test Fixture #1 (Discharge Tip 250 μm, body diameter 350 μm)                                                                                   |
| 2.4                                                                                                                       | ES640-JS002-2      | JS-002 Test Fixture #2 (Discharge Tip 120 μm, body diameter 200 μm)                                                                                   |

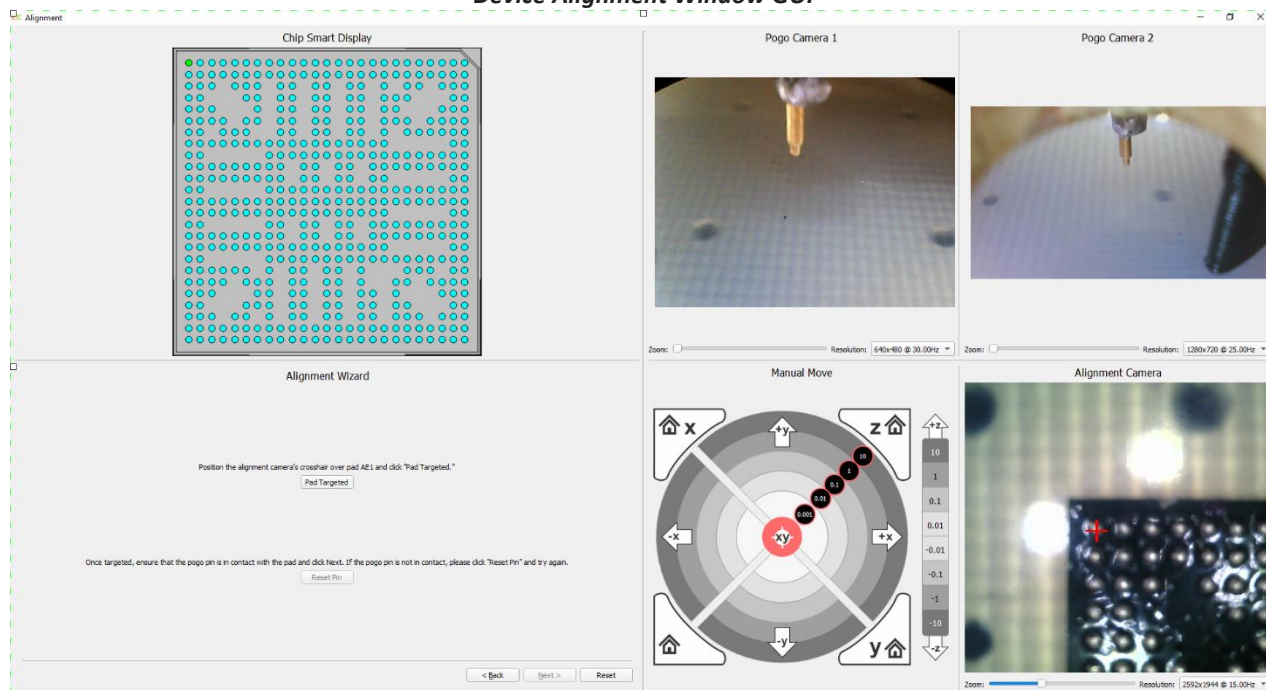
| <b>ANSI/ESD S5.3.1-2009 Standard Related Solution</b>                    |                 |                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (Not recommend for new designs)                                          |                 |                                                                                                                                                                                                                                                                                            |
| <b>3.1</b>                                                               | ES640-S09-F     | ANSI/ESD S5.3.1-2009_FI-CDM Discharge Unit                                                                                                                                                                                                                                                 |
| <b>3.2</b>                                                               | ES640-S09-D     | ANSI/ESD S5.3.1-2009_D-CDM Discharge Unit                                                                                                                                                                                                                                                  |
| <b>3.3</b>                                                               | ES640-S09-C     | ANSI/ESD FR4 Calibration Module (4 and 30 pF)                                                                                                                                                                                                                                              |
| <b>3.4</b>                                                               | ES640-J13       | JEDEC-JESD22-C101F-2013 FI-CDM Discharge Unit                                                                                                                                                                                                                                              |
| <b>RP-CCDM Contact First CDM Solutions</b>                               |                 |                                                                                                                                                                                                                                                                                            |
| (New methods for discharge stability improvements, not standardized yet) |                 |                                                                                                                                                                                                                                                                                            |
| <b>4.1</b>                                                               | ES640-RPCCDM    | ESDEMC Patented Contact First CDM Solution<br>(Very repeatable contact first method, meets JS002 requirement, not require VF-TLP)<br>(Including one ES640-PRCCDM-P1 Discharge Unit)                                                                                                        |
| <b>4.2</b>                                                               | ES640-RPCCDM-P1 | RP-CCDM Discharge Unit for Packaged Device                                                                                                                                                                                                                                                 |
| <b>4.3</b>                                                               | ES640-RPCCDM-W1 | RP-CCDM Discharge Unit for Bare-die & Wafer Device                                                                                                                                                                                                                                         |
| <b>LI-CCDM Contact First CDM solution</b>                                |                 |                                                                                                                                                                                                                                                                                            |
| <b>5.1</b>                                                               | ES640-LICCDM    | LI-CCDM Discharge Solution – System Integration Package<br>(Including one ES640-LICCDM -P1 Discharge unit, require VF-TLP)                                                                                                                                                                 |
| <b>5.2</b>                                                               | ES640-LICCDM-P1 | LI-CCDM Discharge Unit for Packaged Device                                                                                                                                                                                                                                                 |
| <b>5.3</b>                                                               | ES640-LICCDM-W1 | LI-CCDM Discharge Unit for Bare-die & Wafer Device                                                                                                                                                                                                                                         |
| <b>5.4</b>                                                               | ES640-VFTLP     | VF-TLP module for CC-TLP or LI-CCDM Method<br>(This VF-TLP module is a compact VF-TLP for the ES640 system. The default configuration is 1 rise-time + 1 pulse-width with limited expansion capability. If more pulse shape options are needed, model ES622 TLP/VF-TLP is the best option) |
| <b>CC-TLP Solution</b>                                                   |                 |                                                                                                                                                                                                                                                                                            |
| <b>6.1</b>                                                               | ES640-CCTLTP    | CC-TLP Solution – System Integration Package<br>(Including 1 set of ES640-CCTLTP-1-50 & calibration gauge)                                                                                                                                                                                 |
| <b>6.2</b>                                                               | CC-TLP-1-50     | CC-TLP Discharge Unit with 50m OD GND Plate                                                                                                                                                                                                                                                |
| <b>6.3</b>                                                               | CC-TLP-1-100    | CC-TLP Discharge Unit with 100m OD GND Plate                                                                                                                                                                                                                                               |
| <b>6.4</b>                                                               | CC-TLP-1-Cal    | CC-TLP calibration gauge for needle height                                                                                                                                                                                                                                                 |
| <b>Third Party Instruments for CDM System</b>                            |                 |                                                                                                                                                                                                                                                                                            |
| <b>7.1</b>                                                               | MISC-OSC2G      | Digital Oscilloscope (2 GHz, 20 Gs)                                                                                                                                                                                                                                                        |
| <b>7.2</b>                                                               | MISC-OSC6G      | Digital Oscilloscope (6 GHz, 20 Gs)                                                                                                                                                                                                                                                        |

## 6. System & Software Pictures

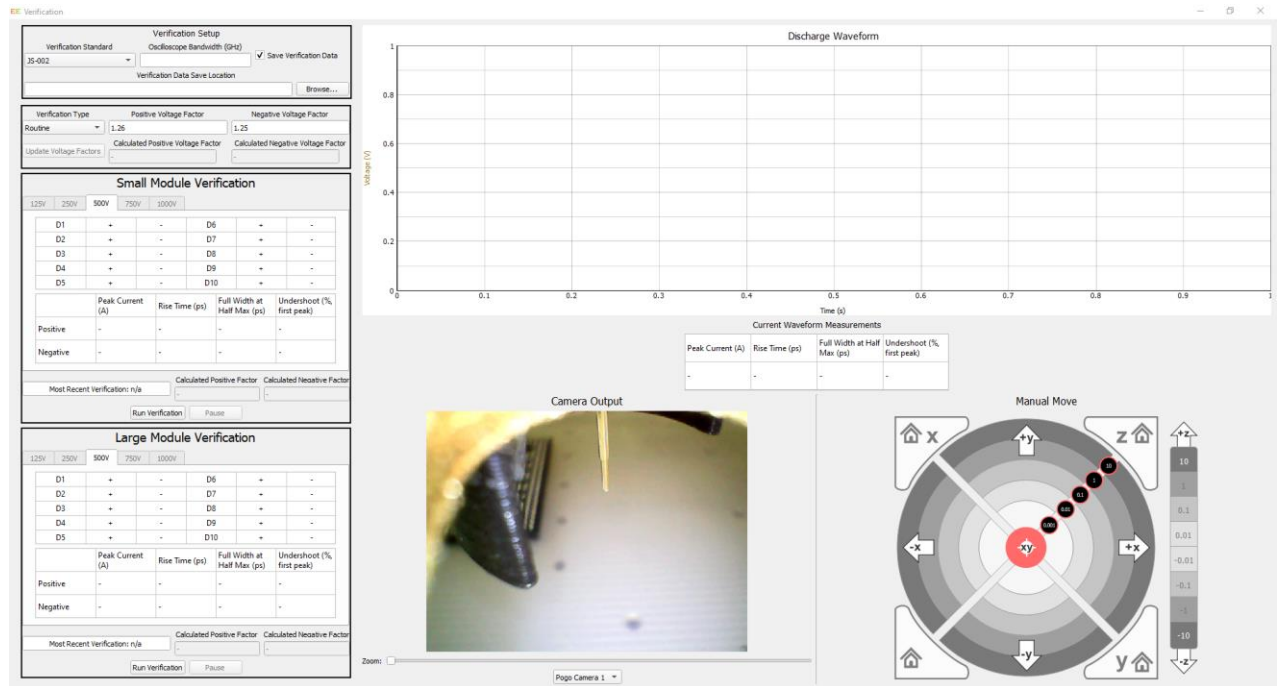
**Main Window GUI**



**Device Alignment Window GUI**



**System Calibration / Verification GUI**



JS-002 Head over a BGA Chip

