# ESD Simulator for Electronics Parts



**Reproduce ESD phenomena variably**

- Simulator to reproduce electrostatic discharges (ESD) which are caused by a charged human body or machine designed with capacitor type and discharge the ESD to electronic devices for evaluating the resistibility against ESD.
  In case the discharger is a human body, the test is called as Human Body Model (HBM) and in case it is a metallic object, the test is called as Machine Model (MM). This simulator is available to perform the both tests.

## Target or potential customers

- Communication equipments (Mobile phone, mobile network devices, etc.)
- Materials (Plastic resin, film board, etc.)
- Electronic devices (Semiconductor, LED, crystal oscillator, SAW filter etc.)
- Others (Electric or electronic equipments demanded for EMC tests)

## Test standards

- MIL-STD-883
- EIAJ ED-4701 etc.
- Individual industrial standards
- Private standards by manufacturers

* "Private standards by manufacturers" shall be discussed separately

ESD Simulator for Electronics Parts

# ESS-6002 /6008

## Feature

- Optimal for testing sensitive devices because of the output voltage from 10V (1V step)(ESS-6002).
- Enables to evaluate the robustness against the breakdown voltage with the output voltage up to 8kV (10V step).(ESS-6008)
- The direct discharge to the IC clip is available with the free board equipment
- Constant qualitative discharge is available with the semi-automatic operation (in Semi-Automatic Precision Type).
- Available both for Human Body Model (HBM) test and Machine Model (MM) test
- Enable to discharge standards waveforms in between terminals
- Caracteristics variation of DUT can be verified with measurement terminal (The measurement equipment is necessary besides)
- Enable to set the faster rise-up (with an optional card)

Semi-automatic precision tyoe probe stand

## Test Standard

| Human Body Model (HBM) | Machine Model (MM) |
|---|---|
| AEC-Q100-002-Rev.D Jul.2003 | AEC-Q100-003-REV -E Jul.2003 |
| ESDA ANSI/EOS/ESD-STM5.1-2001 | ESDA ANSI/ ESD STM5.2-1999 |
| IEC 61340-3-1Ed.1.0 2002 | IEC 61340-3-2 Ed.1.0-2002 |
| IEC 60749-26 Ed.1.0 2003 | IEC 60749-27 Ed.1.0 2003 |
| JEDEC JESD22- A114E Jan.2007 | JEDEC JESD22- A115A Oct.1997 |
| JEITA EIAJ ED-4701/300 Aug.2001 Test Method304 | JEITA EIAJ ED-4701/300 Aug.2001 Reference Test Method |
| MIL-STD-883F 3015.7 Mar.1989 | |

## Specification

| Parameter | Specification |
|---|---|
| Output voltage | ESS-6002 10~2000V±10% (1V step) |
| | ESS-6008 100~8000V±10% (10V step) |
| Porality | Positive and negative |
| Repetition period | 0.3~99s±10% |
| | 0.1s step to 10s, 1s step over 10s |
| EXT TRIG IN | ±15V Max BNC coaxial connector |
| | Operation in TTL fall-down (LOW over than 100μs or short between terminals) |
| STAGE CONTROL | Control with pptional semi-automatic precision type probe stand (MODEL 18-00076A) Dsub connector |
| INTERLOCK | Stop test when open on the termial board or between terminals |
| Power supply | AC100~240V±10% 50Hz / 60Hz |
| Power consumption | 25VA |
| Operating temperature range | 15~35°C |
| Storage temperature range | -10~50°C |
| Operating humidity range | 25~75%RH (without dew) |
| Storage temperature range | 0~85%RH (without dew) |
| Dimension | (W) 340 X (H) 199 X (D) 300mm (Projecxtion excluded) |
| Mass | Approx. 6kg |

## Machine Model (MM) Probe **01-00055A**

| Parameter | Specification |
|---|---|
| Operating temperature / humidity range | 15~35°C / 25~75%RH (without dew) |
| Dimension / Mass | (W) 50 X (H) 242 X (D) 54mm / Approx. 760g |
| CR | C : 200pF±10%  R : 0Ω |

**Output waveform at short**

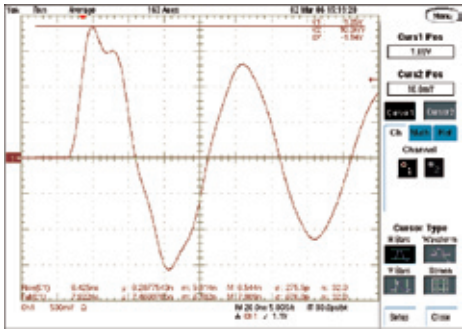
| Voltage | 1st peak current Ip 1 | 2nd peak current Ip 2 | Cycle | Ringing Irs |
|---|---|---|---|---|
| 100V | 1.75A±10% | | | |
| 200V | Min : 3.5A -10%<br>Max.: 3.8Z | Min : 67% of Ip 1<br>Max : 90% of Ip 2 | Min : 66ns<br>Max : 90nx | ≦30% of Ip 1 |
| 400V | 7.5A±10% | | | |
| 800V | 14A±10% | | | |

**Output waveform at 500Ω(±1%) load**

| Voltage | Peak current Ipr | Current at 100ns 1100nx | Current at 200ns 1200ns |
|---|---|---|---|
| 100V | — | — | — |
| 200V | — | — | — |
| 400V | Min : 0.85A<br>Max : 1.1745A | 0.29A±10% | Min : 35% of 100ns<br>Max : 45% of 100ns |
| 800V | — | — | |

* Output voltage depends on capbiities of the simulator (ESS-6002 / 6008)

### Output waveform



MM PROBE

## Human Body Model (HBM) Probe **01-00054A**

| Parameter | Specification |
|---|---|
| Operating temperature / humidity range | 15~35°C / 25~75%RH (without dew) |
| Dimension / Mass | (W) 50 X (H) 242 X (D) 54mm / Approx. 760g. |
| CR | C : 100pF±10%  R : 1.5kΩ±1% |

**Output waveform at short**

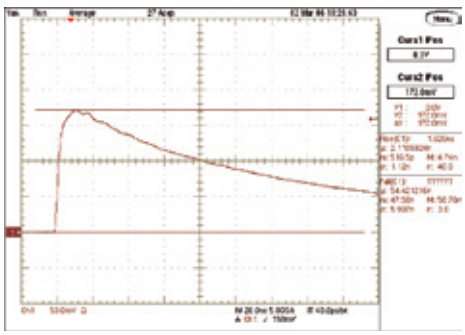
| Voltage | Peak current Ips | Rise time Trs | Fall down time Tds | Ringing Irs |
|---|---|---|---|---|
| 250V | 0.17A±10% | | | |
| 500V | 0.33A ±10% | | | |
| 1000V | 0.67A±10% | Min : 2ns<br>Max : 10ns | Min : 1.3ns<br>Max : 1.7nx | <15% of Ips |
| 2000V | 1.33A±10% | | | |
| 4000V | 2.67A±10% | | | |
| 8000V | 5.33A±10% | | | |

**Output waveform at 500Ω(±1%) load**

| Voltage | Peak current Ipr | Ipr/Ips | Rse time Trs | Fall down time Tds | Ringing Irs |
|---|---|---|---|---|---|
| 250V | – | – | – | – | – |
| 500V | min : 60% of Ips<br>max : 0.25A–25% | ≧63% | 5～25ns | 200ns±40ns | ≦15% |
| 1000V | min : 60% of Ips<br>max : 0.5A–25% | ≧63% | 5～25ns | 200ns±40ns | ≦15% |
| 2000V | min : 60% of Ips<br>max : 1.0A–25% | ≧63% | 5～25ns | 200ns±40ns | ≦15% |
| 4000V | min : 60% of Ips<br>max : 2.0A–25% | ≧63% | 5～25ns | 200ns±40ns | ≦15% |
| 8000V | – | – | – | – | – |

* Output voltage depends on capbiities of the simulator (ESS-6002 / 6008)

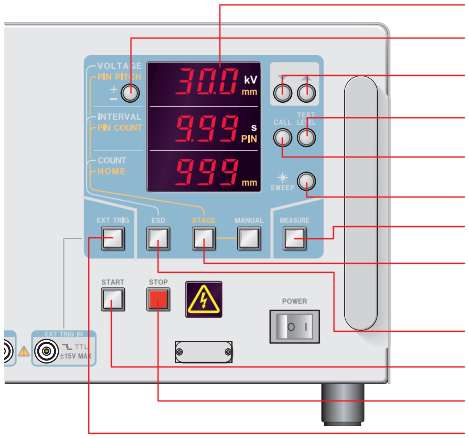
### Output waveform



HBM PROBE

## Front Panel

### Simple usability



**Digital indication** : Indicate output voltage, discharge interval, No. of time of discharge

**Polarity switching button**: Select the discharge polarity

**▼▲Up & Down switch** : Change the selected value. Up and down quickly with the push continuously

**Test level switch** : Voltage values preset along conforming to HBM and MM

**CALL switch** : Enable to preset 5 test patterns

**Sweep switch** : Enable to sweep from discharge start voltage to the finish voltage with preset voltage unit

**MEASURE switch** : Switch to BNC terminal for measuring DUT before and after the test

**STAGE switch** : Select PIN PITCH, PIN COUNT and HOME in the setting items for using semi-automatic precision type probe stand.

**ESD switch** : Select VOLTAGE, INTERVAL and COUNT in the setting items

**START switch** : Start test

**STOP switch** : Stop test

**EXT TRIG switch** : Used for starting test with external signal

## Accessory

| Item | Q'ty |
|---|---|
| Human Body models (HBM) discharge probes (MODEL 01-00054A) | 1 set |
| Machines Model (MM) discharge probes (MODEL 01-00055A)<br>(Attached with 2 pcs. of waveform adjustment card MODEL 06-00065A) | 1 set |
| AC code | 1 pc. |
| Instruction manual | 1 volume |

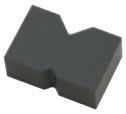
## Free Type Probe Stand 18-00075A

| Parameter | Specification |
|---|---|
| Dimension / Mass (probes stand unit) | (W) 200x(H)330x(D)290 mm / Approx. 1.5kg |
| Dimension / Mass (free board) | (W) 100x(H)27x(D)180 mm (Projection excluded) / Approx. 200g |
| Vise gap | 110 mm |
| Others | V-shape block included |

Probes stand uni

Discharge clips
(Black and red colord X 2)

Free board



V-shape block

Figure the probe connected

## Dischargeing figures

When free type probe stand 18-00075A is used

Noise is discharged from the IC clip attached with the probe stand to devices which are fixed using the free board or the V-shape block

# ESS-6002 / 6008

## Semi-Automatic Precision Type Probe Stand **18-00076A**

Easy test to semiconductors whose pitches are mm or inch since the minimum resolution accuracy is 0.01mm.

- The stage moves automatically accompanied by the discharge.
- Easy removal and attachment of the probe.
- Available for easy measurement with a measurement equipment after the discharge since the probe can be fixed at the discharge.

| Item | Specification |
|---|---|
| Dimension / Mass | (W) 250x(H)400x(D) 300 mm / Approx 7 kg |
| Applicable IC size | Maximum size : 40 mm X 40mm Minimum lead pitch : 0.4 mm |
| X-Y-θ table | |
| X axis | Manual movement : 20mm with dovetail groove feed screw mechanism |
| Y- axis | Motor drive (Maximum velocity : 13 mm/s) Movement : 40 mm (Y resolution : 0.01mm)<br>* Stepping motor & ball screw |
| θ axis | Manual movement: 360° |
| Z-axis | Manual movement : 20mm (A spring built-in) |
| Origin adjustment | Manual |

Main unit

Discharge pin 20 pcs.

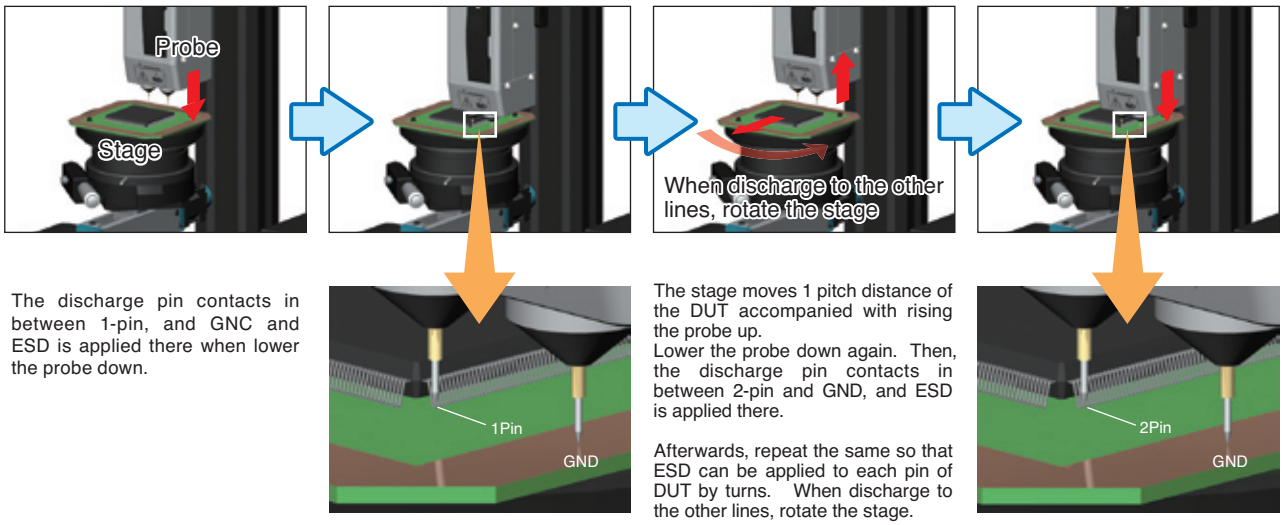
GNC clip 2 pcs.

Control cable
for connection to main unit

FG connection cable
for connection to main unit

Figure the probe attached

## Application example




The discharge pin contacts in between 1-pin, and GNC and ESD is applied there when lower the probe down.

The stage moves 1 pitch distance of the DUT accompanied with rising the probe up.
Lower the probe down again. Then, the discharge pin contacts in between 2-pin and GND, and ESD is applied there.

Afterwards, repeat the same so that ESD can be applied to each pin of DUT by turns. When discharge to the other lines, rotate the stage.

## Waveform Adjustment Card (4 pcs. in 1 set) MODEL : 06-00064A

For changing rise up time or cycle of the waveform
(Not specified in Standards)

| Human Body models (HBM) probe | Machines models (MM) probe |
|---|---|
| HBM-F card for HBM (Fast) | MM-HF card for MM (High Frequency) |
| Rise-up time : 2~4ns (typical) | Cycle : 69~75ns (typical) |
| HBM-S card for HBM (Slow) | MM-LF card for MM (Low Frequency) |
| Rise-up time : 6~8ns (typical) | Cycle : 83~89ns (typical) |

## Discharge Clip 2.54mm pitch type MODEL : 08-00013A

Discharge clip
2.54mm pitch type
MODEL : 08-00013A
Red colord 2 pcs.
Black colored 2 pcs.

## Discharge Clip 0.3mm pitch type MODEL : 08-00014A

Discharge clip
0.3mm pitch type
MODEL : 08-00014A
Red colored 2 pcs.
Black colored 2 pcs.

## Option for Free Type Probe Stand : Dust-Protection case MODEL : 11-00012A

## Option for Semi-Automatic Precision Type Probe Stand : Dust-Protection case MODEL : 11-00013A

– M e m o –