Field-Induced/Direct Charging CDM

Fully Automated CDM Tester

Model CDM-550 Series

Model CDM-550D	: Direct Charging
Model CDM-550DQ	: Direct Charging with Coulomb Measurement
Model CDM-550FQ	: Field Induced Charging with Coulomb Measurement
Model CDM-550DFQ	: Field Induced/Direct Charging with Coulomb Measurement
Model CDM-550DFQM	: Automated damaged detection attached to the above configuration

Applications
- Verification test
- Qualification test
- Acceptance or Approval test
- Static Charge Environment test

Features and Functions

- Field induced CDM via relay
- Stable and repeatable Waveform
- Current measurement at DUT pin side
- Coulomb measurement up to 100nC
- Simple pin positioning
- Automated test up to 10 DUT's

- Measure damage voltage or energy
- Test results available to the production
- Fully automated CDM test
- Automatic test of VQFP and UQFP
- Test results handled by data base
- Test results transferred via LAN

General description
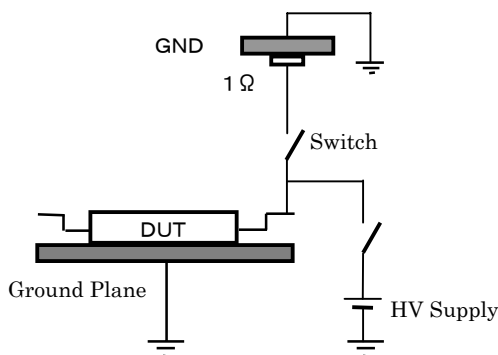
Direct Charging Method
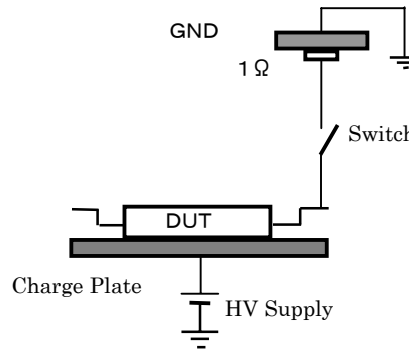
Field Induced Charging Method

Among the most advanced electron devices such as ULSI, MR head, LCD panel, GaAs IC, Blue/green LED and Laser diode, failures caused by CDM(Charged Device Model) are increasing. This CDM-550 series is the world first CDM simulator that uses mercury reed switch to apply CDM stress to these devices.

There are 2 types of CDM simulators, Field-induced charging method (F-CDM) and Direct charging method (D-CDM). F-CDM simulates the stress when a device pin in the high electric field touches the other metal object. D-CDM simulates the stress when a pin of the charged device makes contact to a metal object. Both methods repeatably simulate the device-handled environment.

Model CDM-550 not only stress these 2 methods but optionally add the coulomb measurement at the stress. Traditionally, device strength has been defined by the (stressed) voltage. But, this voltage depends on the capacitance between the device and Charge plate (or ground plane). If coulomb value that damages the device is measured, it is independent of the capacitance, so that test result can be applied to the assembling line. Static charge on the PC board where devices are mounted should be controlled under it. Other static charge generated by wear, shoes and chairs should also be controlled under it. Ionizers should be monitored if they are reasonably balanced, too.

Major performances of Model CDM-550
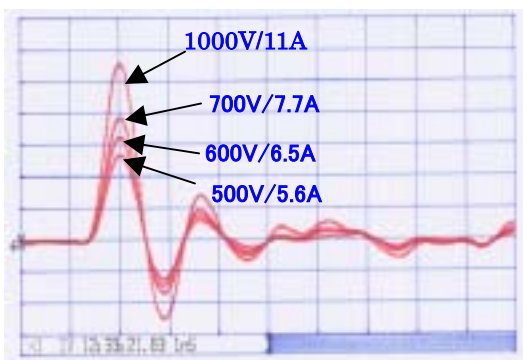
Small module (6.8pF) Waveform
H:1ns/div, V=2A/div
Left waveforms are those of F-CDM. Air discharge is very common for F-CDM but because of humidity, contamination of pin tip and other reasons, air discharge waveform is very unstable. So, stable stress is not given by these type of CDM testers. Model CDM-550 uses reed relay to get very stable current waveforms as well as clean waveforms. It solved air discharge problem.

Discharge probe is the heart of the CDM stressor. Probe for F-CDM, D-CDM and others are available. DUT jig is tailored to a device under test (DUT). Up to 10 DUT's can be attached on a DUT jig so that all of them can be zapped sequentially. If DC test head is ordered optionally, damage is automatically detected after each group of zaps. Contact between the CD test head and DUT are made by pogo.

Discharge Probe

DC Test Head

Coulomb meter

DUT jig
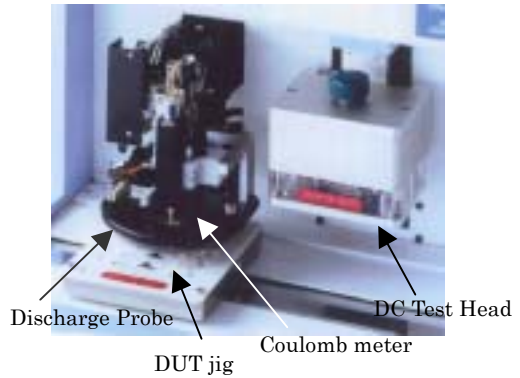
Charged Voltage	61	62	63	64	65
400	2.8nC	2.8nC	2.8nC	2.8nC	2.8nC
-400	-2.8nC	-2.8nC	-2.8nC	-2.8nC	-2.7nC
500	3.5nC	3.5nC	3.5nC	3.5nC	3.5nC
-500	-3.5nC	-3.5nC	-3.5nC	-3.5nC	-3.5nC
600	4.3nC	4.3nC	4.3nC	4.3nC	4.2nC
-600	-4.2nC	-4.2nC	-4.2nC	-4.2nC	-4.2nC
700	5.0nC	4.9nC	5.0nC	5.0nC	4.9nC

Left table describes the coulomb measurement results. Amount of Charge looks proportional to the charged voltage, but it may not be true at high voltage region.

Right picture is an example window used for positioning between DUT pins and probe tip. DUT shrinks very rapidly and now, 0.4mm pitch is very common. CDM-550 has a CCD camera, capacitance meter and coulomb meter so that positioning is very quickly done independent on pin count, just in a few minutes.
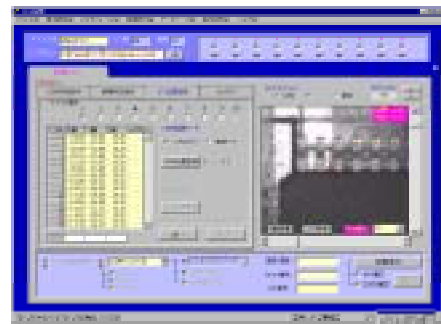
Model CDM-550DFQM

Left photo describes the maximum system. Zapping the CDM stress and damage detection after it can be conducted automatically. Fully automated test is limited down to 0.4mm pin pitch and up to 256 pins. Finer pitch or more pin count than 256 should be tested manually. 1024 pin DUT can be zapped automatically.

Specificactions

1. CDM-550 Series common specifications (Main body)

- Pin count: 1024/DUT
- Max # of DUT: 10/DUT jig
- Zapping Voltage: 0 ~ ±4kV, 10V step
- Power supply: 100CAV±10%, 1φ, 300VA (Excluding PC)
- Size/weight: 580W x 530D x 370H, 20kg (Excluding PC)
  1400W x 800D x 1070H, 140kg (Including PC and table/rack)

- DUT type: DIP, QFP, SOP, TAB and others
- Positioning Accuracy: <±0.05mm

3. CDM-550 Series discrete specifications

① CDM-550D
· Method: Direct charging
· Test Standard: EIAJ, ESDA,(JEDEC)
· Positioning: CCD camera, capacitance sensor and interrupter

② CDM-550DQ
Coulomb meter is added to ①.
· Coulomb measurement range:
  0.0~100nC(with 0.1nC increment)

③ CDM-550FQ
· Method: Field-induced charging
· Test Standard: (EIAJ), ESDA, JEDEC
· Positioning: CCD camera, Coulomb meter and interrupter

④ CDM-550DFQ
· Method: Direct charging and Field induced charging
· Test Standard: EIAJ, ESDA, JEDEC
· Positioning: CCD camera, capacitance sensor, Coulomb meter and interrupter

⑤ CDM-550DFQM
DC measurement system added to ④.
Pin count and pin pitch limitation exist for automated test.
  Pin count : < 257 pins
  Pin pitch : > 0.4mm

2. DC Measurement system specifications (For damage detection)

① Measurement
· V-I curve comparison method
· DC parameter comparison method

② Source measure unit
· Source voltage: 0 ~ ±30V
· Accuracy: < ±2% ±10mV
· Current range: 0 ~ 100mA
· Accuracy:< ± 2% ± 2LSB ± Voltage error

③ Bias supply(Vcc1)
· Voltage range: 0 ~ ±30V
· Accuracy: < ±2% ±50mV
· Current range: 0 ~ 500mA
· Accuracy: <±2% ±2mA

④ Bias supply(Vcc2)
· Voltage range: 0 ~ ±15V
· Accuracy: < ±2% ±50mV
· Current range: 0 ~ 500mA
· Accuracy: <±2% ±2mA

⑤ Pin Matrix
· Pin count: Max. 256
· Each DUT is connected to one of below VCC1, VCC2, Source measure unit, Ground, pull-up (to VCC1 via 10kΩ) or pull-down (to ground via 10kΩ)
Specifications subject to change without notice.

Contact: