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1 Qualification test with the M-CDM ESD test system developed at Fraunhofer EMFT
2 M-CDM test head including the ground plane and cameras

MODULAR ESD-TESTER FOR THE CHARGED DEVICE MODEL M-CDM

Future trends

Upcoming mega trends to be considered for CDM testing are:

- Measurement of discharge currents
- Extremely small size pads and balls even for 3D-stacked circuits
- Increasing GHz-frequencies prohibiting larger protection
- Increasing package sizes with impedance controlled interconnects
- Complex pin layouts and test plans
- Fully automated handling and assembly systems

These trends require precise CDM test systems providing maximum testing flexibility. Building on 20 years of experience of Fraunhofer EMFT with CDM tester development, analytical CDM test and CDM protection development for many industrial clients, the modular M-CDM is flexibly tackling the demands and complexity of today's and tomorrow's CDM test.

Advantages

Modular system setup

- All key components such as wafer prober (e.g. Cascade PA 200 with 200 mm chuck), single shot GHz-oscilloscope and high voltage source are robust off-the-shelf components controlled via an Agilent VEE program that is customized to the needs of the test lab

High positioning accuracy (wafer prober)

- Deployment of a standard wafer prober provides a high positioning accuracy required for small size pads and balls

Individual adaption to customer needs

- The program interfaces to descriptions of device layouts and test plans in a Microsoft Excel® spread sheet. The program interface can be adapted to individual needs

Large field charge plate

- Allows testing of larger devices (also Charged Board Model)

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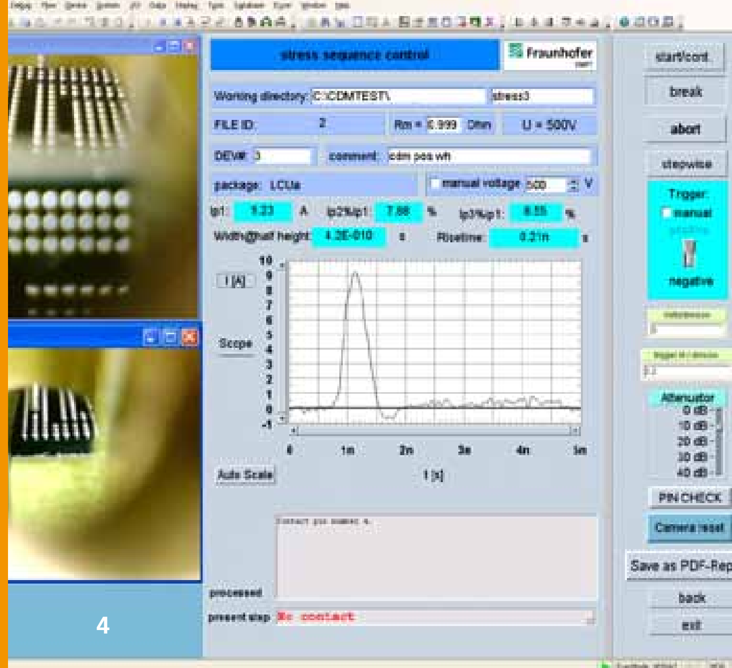

Arbitrary charging and discharging sequences (timing, sequence)

- Allows testing of complex pin layouts and test plans

User specific, automated data acquisition and evaluation of stress parameters

- All discharge currents are automatically measured and stored. The relevant stress parameters are summarized in a suitable output file

Fraunhofer EMFT lab serves as a back-up for tests during maintenance

- Since Fraunhofer EMFT provides also CDM testing services for its customers, a continuous test flow even during the maintenance of your M-CDM system is ensured

Further advantages of the M-CDM system are the flexible use of the wafer prober for other test set-ups like TLP and vf-TLP or pad probing for checking leakage criteria. It can also be easily upgraded to a spark free contact mode method such as Capacitive Coupled TLP (CC-TLP). Existing equipment can be integrated into the system.

The adaption and integration into a CE-compliant test system will be done within an individual R&D project by Fraunhofer EMFT.

System Description

- M-CDM control unit which contains a commercial high voltage (HV) source FUG HCP 14-3500, a HV switch which enables and disables the HV during operation, and relay switch matrix for controlling an optional, electrically switchable attenuator
- Field Charge Plate FCP, which is mounted on the chuck of the wafer prober and which connects to the HV output of the control unit
- Two ground planes (GP) which are compliant with the standards ANSI/ESD-S5.3.1-2009 and JEDEC JESD22-C101D 2008
- Two USB cameras for convenient device outline definition and monitoring of the discharge pin during the test
- System controller (Win7 PC including 17''16:9 flat screen) with the M-CDM controller SW

Technical Data

Max. CDM voltage	3.0 kV
Supported standards (adaptable):	ANSI/ESD-STM5.3.1-2009; JEDEC JESD22-C101F 2013
Size of the Field Charge Plate	19 cm x 22 cm
Precision of positioning	+/- 2µm (wafer prober PA200)

Service

Support can be tailored to your requirements. From on-demand maintenance to an "all inclusive" package with preventive maintenance including CDM testing services during the maintenance of the tester.

3 Capacitive Coupled TLP probe for BGA and Wafer Test level

4 M-CDM screenshot with discharge pulse (4GHz-Oscilloscope)