Quality is more than a word

ESPEC

TDDB Evaluation System

AMM-1000

CAT.NO.E00517-Z202

Precise data acquisition
Endless pursuit for reliability
The Oxide Film Property Evaluation System

As wafer size is enlarged for mass production of high-density, high-function LSIs, reliability evaluation of oxide film is on increasing demand, which is key for LSI reliability. ESPEC'S TDDB Evaluation System will play an indispensable role for analyzing failure caused by pressure resistivity of thin insulation oxide film and characteristics and flattening of oxide film, at wafer, glass substrate, and package level.

Prober for LCD

MEASUREMENT EVALUATION SYSTEMS

CONDUCTOR RESISTANCE EVALUATION SYSTEM	• THROUGH-HOLE CONDUCTOR EVALUATION SYSTEM • SOLDER-JOINT CONTACT EVALUATION SYSTEM • BGA, CSP SOLDER JOINT CONTACT EVALUATION SYSTEM • CONNECTOR CONTACT RESISTANCE EVALUATION SYSTEM • FPC LIFE EVALUATION SYSTEM • OTHER INTERCONNECTION MATERIAL CONTACT EVALUATION SYSTEM
ION MIGRATION EVALUATION SYSTEM	
INSULATION RESISTANCE EVALUATION SYSTEM	• CAPACITOR INSULATION RESISTANCE EVALUATION SYSTEM • PCB, PWB INSULATION RESISTANCE EVALUATION SYSTEM • INSULATION RESISTANCE EVALUATION SYSTEM FOR OTHER INSULATION MATERIAL
LOW-K INSULATION CHARACTERISTIC EVALUATION SYSTEM	
LEAK CURRENT MEASUREMENT SYSTEM	• CAPACITOR LEAK CURRENT MEASUREMENT SYSTEM • FET LEAK CURRENT MEASUREMENT SYSTEM • SEMICONDUCTOR REVERSE BIAS LEAK CURRENT MEASUREMENT SYSTEM
CAPACITOR TEMPERATURE PROPERTY EVALUATION SYSTEM	
LASER DIODE AGING SYSTEM	
INTERCONNECTION MEASUREMENT EVALUATION SYSTEM	• CONNECTOR DISCONNECTION EVALUATION SYSTEM • SOLDER-JOINT DISCONNECTION EVALUATION SYSTEM • HARNESS CONTINUITY EVALUATION SYSTEM
ELECTRONICS PARTS ELECTRIC PROPERTY AUTOMATIC EVALUATION SYSTEM	
TEMPERATURE COMPENSATED CRYSTAL OSCILLATOR TEMPERATURE PROPERTY TEST SYSTEM	
OPTICAL COMPONENT ENVIRONENTAL TEST SYSTEM	
ELECTRO-MIGRATION EVALUATION SYSTEM	• LSI ELECTRO-MIGRATION EVALUATION SYSTEM • GMR HEAD ELECTRO-MIGRATION EVALUATION SYSTEM • GMR HEAD ELECTRO-MIGRATION RH EVALUATION SYSTEM • HIGH FREQUENCY ELECTRO-MIGRATION EVALUATION SYSTEM
TDDB EVALUATION SYSTEM	• WAFER LEVEL • PACKAGE LEVEL
SEMICONDUCTOR PARAMETER AUTOMATIC EVALUATION SYSTEM	• FET(HOT-CARRIER) PROPERTY EVALUATION SYSTEM • TRANSISTOR PROPERTY EVALUATION SYSTEM
COMBINED ENVIRONMENTAL TESTING, MEASUREMENT & EVALUATION SYSTEM	• AUTOMATED RESONANCE POINT SEARCH & MEASUREMENT SYSTEM

Performance

Prober for LCD

APPLICATIONS

- **TDDB evaluation system**

  Package level
  Wafer level (for 8 inch wafer, 12 inch wafer)

- **FET(Individual transistor) property evaluation system**

  Package level
  Wafer level (for 8 inch wafer, 12 inch wafer)

- **Semiconductor, Liquid crystal glass substrate, etc..**

Connection

System configuration to fit number of measurement

Equipped with DC Multi Source Measurement (MSM) on each channel, which enable monitoring and output of voltage and current. MSM consists of 4 channels per board. The basic 40-channel configuration stores up to 10 boards. The system can be upgraded according to measurement volume and condition up to 5 units (200 MSMs).

Precise current and voltage application measurement

Current at 9 ranges, measurement resolution of maximum current ±100mA, and minimum current ±1pA. Voltage at 2 ranges, resolution of maximum voltage ±50V and minimum voltage 1mV. Enables a wide range and precise application and measurement.

Measurement at minimum 10msec

Delivers high-speed measurement for multiple channels. Measures at top speed of 10msec per 40 channels, while acquiring data.

Various evaluation items

The TDDB Evaluation System is configured for wafer level and liquid crystal glass substrate level, by effectively systemizing MSM. It also applies for requirements of QDB evaluation and TZDB evaluation, while FET property evaluation can also be realized by exchanging software.

Output by CSV file

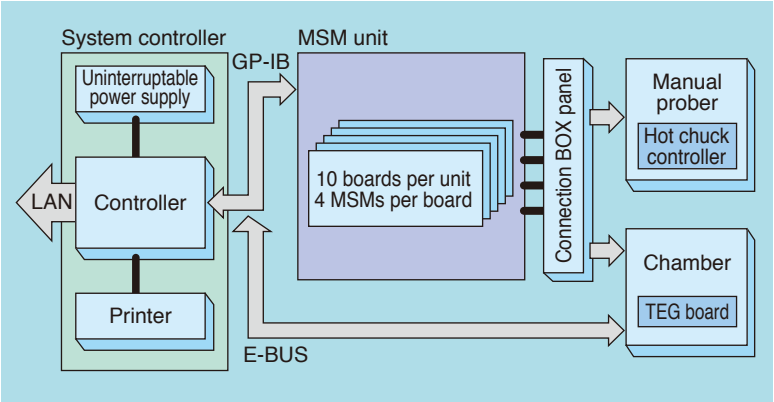
Automatic compilation of CSV file enable output by normal plotting. (Spread sheet software Microsoft EXCEL data can also be converted)

LAN compatible

Expansion to high-voltage load

To upgrade the system, we provide MSM boards designed specifically for a maximum +100V high-voltage load.

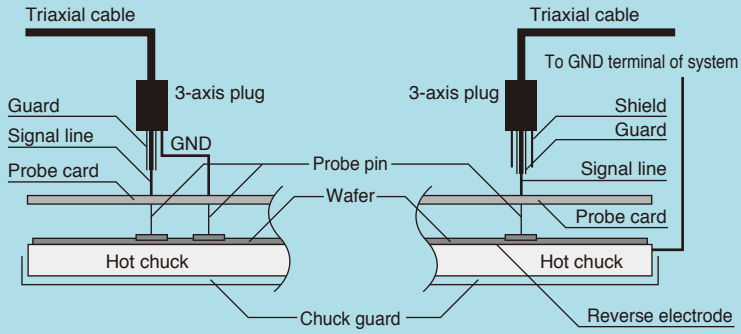
SYSTEM BLOCK DIAGRAM



- Uninterruptable power supply
  Backup power supply for controller (Does not reset automatically when power restored)
- MSM unit
  Incorporates 40ch MSMs per unit (maximum 5 units)
- Connection BOX panel
  Can be set as panel for prober shield BOX.
- Triaxial cable
  Connects specimen and MSM to reduce noise level.
- Chamber
  Evaluation at package level of specimen, under high temperature, using the TEG board.
- E-BUS
  Temperature control, monitor, alarm control of chamber with a GP-IB adapter.

CONNECTION TO A PROBER

● 2-terminal measurement



● 1-terminal measurement

Probe card at maximum 160 pin/ heat-resistant temperature 260℃, according to die layout of wafer.
Probe/ card material and structure will be consulted.
To connect the triaxial cable and probe card, we can suggest optimum specifications such as direct connection with a probe pin, connection to a 3-axis plug, or conversion to a coaxial plug.

- Prober

  Type1
  Wafer level prober
  For both 5 inch type and 8 inch type
  Compatible with 300mm wafer type full automatic prober

  Type2
  Liquid crystal glass substrate (maximum 500×400mm)
- Hot chuck
  Compatible prober :
  maximum 300℃ for wafer level
  maximum 150℃ for liquid crystal glass substrate.
- Probe card
  We offer optimum probe card to meet required specification and layout such as number of channels, pins and wafer size. Enables whole contact with a single shot.

SPECIFICATION

Model		AMM-1000
Sofware		Windows® 2000
Voltage/current application range		−50V to +50V/ −100mA to +100mA
Resolution		1mV step/ 1pA step
Voltage/current measurement range		−50V to +50V/ −100mA to +100mA
No. of measurement channels		Standard 40ch. Max. installment 200ch
Measurement sampling speed		Short mode: 0 to 100msec→10msec interval 100msec to 10sec→100msec interval Over 10sec→according to time table below Data acquisition without averaging Medium mode: 0 to 100msec→20msec interval 100msec to 10sec→100msec interval Over 10sec→according to time table below Averaging per 1 cycle Long mode: 0 to 10sec→100msec interval Over 10sec→according to time table below Averaging per 5 cycle
External dimension	MSM unit	650W×1300H×800Dmm
	System controller	570W×1100H×900Dmm
Required utility		100V AC±10% 50/60Hz 15A
		100V AC±10% 50/60Hz 50A

Time table		Measurement interval
10[sec]	~100[sec]	1[sec] ×multiply by 1, 2, 5 or 10
100[sec]	~1000[sec]	10[sec] ×multiply by 1, 2, 5 or 10
1000[sec]	~10000[sec]	100[sec] ×multiply by 1, 2, 5 or 10
10000[sec]	~100000[sec]	1000[sec] ×multiply by 1, 2, 5 or 10
100000[sec]	~1000000[sec]	10000[sec] ×multiply by 1, 2, 5 or 10

● MSM Simplex Performance

Voltage range	Resolution	Accuracy	Max. current
±10V	1mV	±(0.2%+10mV)	100mA
±50V	10mV	±(0.2%+50mV)	

Current range	Resolution	Accuracy	Max. current
±100mA	100μA	±(0.5%+100μA+2μA×Vo)	50V
±10mA	10μA	±(0.5%+10μA+200nA×Vo)	
±1mA	1μA	±(0.5%+1μA+20nA×Vo)	
±100μA	100nA	±(0.5%+100nA+2nA×Vo)	
±10μA	10nA	±(1.0%+10nA+200pA×Vo)	
±1μA	1nA	±(1.0%+1nA+20pA×Vo)	
±100nA	100pA	±(10%+100pA+2pA×Vo)	
±10nA	10pA	±(2.0%+10pA+200fA×Vo)	
±1nA	1pA	±(2.0%+1pA+20fA×Vo)	

Accuracy: ±(set value or % of specified value) ±(offset), Vo: output voltage (V)

● Option

• Wafer prober (8 inch, 12 inch)

8 inch

Prober external dimension	Manual prober	750W×1500H× 800Dmm
	Semi auto prober	1100W×1600H× 900Dmm
	Full auto prober	1000W×1200H×1000Dmm
Temperature range	MAX +300℃ Resolution 1℃ step	
Required utility	200V AC±10% 50/60Hz 30A×1	

*Please contact us for details of 12 inch prober.

• Prober for liquid crystal

• Prober card

*Utility for prober differs according to type of prober.
We can coordinate your system accordingly.

• Chamber

Chamber external dimensiona	750W×1500H×800Dmm
Temperature range	MAX +250℃ Resolution 1℃ step
Required utility	200V AC±10% 50/60Hz 20A×1

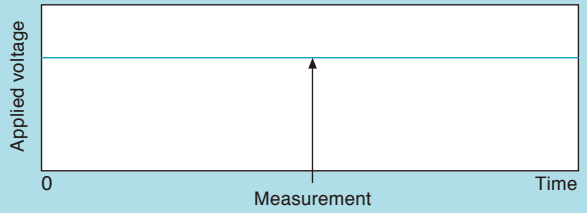
• Applied voltage, +100V Specification

EVALUATION PROCEDURES

Execute test by selecting from the following measurement mode library.

● Fixed Voltage Measurement Mode

Measured with fixed voltage stress. The measurement current and breakdown time are stored.

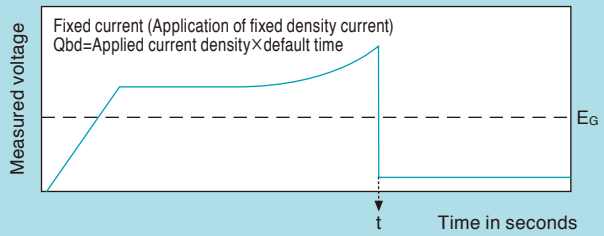


● Soft Breakdown Mode

Measured by changing stress voltage and measurement voltage. The voltage measurement can be adjusted in 5 steps.

● Current Stress Measurement

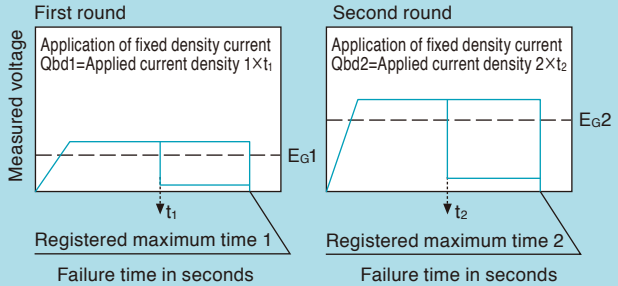
Voltage is measured by applying fixed current. The default time is recorded and stored.



Considered as breakdown when ratio of two continuous measurement value is above ⊿EG electric field strength ratio.

● Two-Step Current Stress Measurement

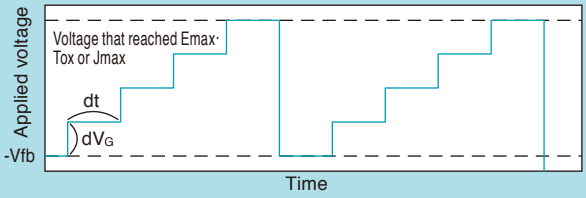
Different fixed current is applied two times (When breakdown does not occur the first time, the second test round is started)



Considered as breakdown when ratio of two continuous measurement value at both rounds is above ⊿EG electric field strength ratio for both the first and second rounds.

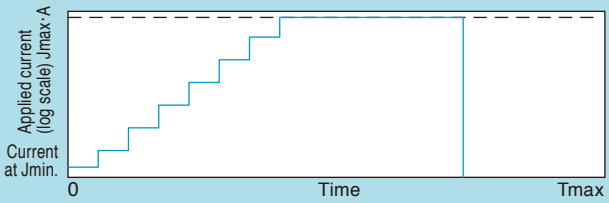
● Step Voltage Measurement (I-V characteristics measurement, TZDB method)

Measures the current at each voltage level while increasing voltage application stepwise.



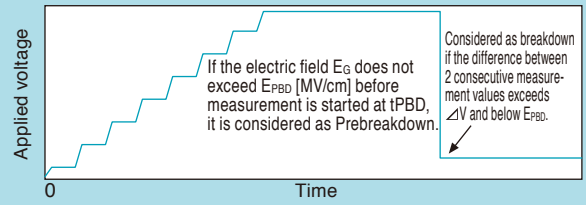
● Step Current Measurement (TZDB)

Measures time dependent change of voltage while increasing current application stepwise.
Test is terminated if a failure is detected.



Measurement is terminated if no breakdown is detected within Tmax.

Sample Measurement Data



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NO12B14C02 (The contents of this catalog is as of December, 2002.)

JSA QMS JIS Q 9001 JSAQ 004

MS JAB CM001

MS JAB CM021

ISO 14001 JACO EC99J2046

UKAS MANAGEMENT SYSTEMS 051

ISO 9001/JIS Q 9001
Quality Management System Assessed and Registered

ESPEC CORP. has been assessed by and registered in the Quality Management System based on the International Standard ISO 9001:2008 (JIS Q 9001:2008) through the Japanese Standards Association (JSA).

ISO 14001 (JIS Q 14001)
Environmental Management System Assessed and Registered

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