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FULLY AUTOMATIC PROBER

UF200

SPECIFICATIONS

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1 Introduction

Automatic Wafer Probing Machine UF200 is a prober for LSI and VLSI wafers designed to meet:

- Large size wafer handling capability (upto 200 mm, 8" wafers)
- Enhanced automation toward operation with no aids of operator
- Clean machine
- Highly accurate probing
- High reliability of ITV fine alignment
- Very rigid Chuck mechanism allowing high-count multi-site probing

2 Features

- (1) Highly accurate prober having the total positioning accuracy of 4 μm over X/Y axes.
The scales attached along the X/Y axes traveling directions are read and referenced in the final step of positioning, ensuring the Chuck positioning accuracy.
The X/Y axes are controlled in the graduation 0.5 μm , and their maximum speed is 200 mm/sec; these accurate control and high speed greatly contribute to the enhancement of reliability and throughput.
- (2) Very rigid Chuck Z/ θ stage to enable high-count multi-site probing in a good stability
The well recognized Z/ θ stage rigidity is made much stronger to meet the need of future multi-site probing.
- (3) In order to reduce the operator's work load, the automatic setup function including the automatic probe-pad alignment function is provided (the automatic probe-pad alignment function is option).
An independent optical system is used so that many probe tips can land on their corresponding pads automatically and precisely.
- (4) User-friendly prober for much easier operation.
A color LCD with touch panel is used for the display and operation.
The content of display and corresponding touch switches are automatically changed according to each operation step and condition, helping the operator from wrong operations and making the complicated functions easier to use.
- (5) Wafer transfer in a more clean condition.
- (6) Data such as device parameters and running status information can be freely sent or received to or from the hard disk, floppy disk, and an external computer system.
The floppy disk uses the MS-DOS format, making easier the data handling with a personal computer system.
- (7) Universal HF test head manipulators are optionally available which are well designed so as to mount and handle various makers' high frequency test heads.
- (8) Semi-automatic probe-card change. (Option)
- (9) In an automated production line, direct communication is possible with a wafer transfer controlling computer or host computer to build up an automated system. (Option)
- (10) The wafer ID recognition function of high recognition ability is optionally available for the purpose of wafer management or automatic setup of device parameters (with an optional software function).

- (11) The standard bus configuration is used for a better system expandability. Various communication functions can be implemented by simply adding necessary boards without any loss of the throughput.
- (12) A 32-bit CPU and a distributed data processing architecture ensure the software extendibility. An ample memory space offers a capability of various function addition.

Note: The above description includes performance of the optional functions.

3 Main Units

The standard composition is as follows:

- (1) Wafer chuck (Chuck)
- (2) Loader unit (including mechanisms of one elevator, prealignment stage and wafer transfer sub-units and their interfaces)
- (3) Fine alignment unit
- (4) Displacement sensor
- (5) Head stage
- (6) Control panel (including the LCD display and keyboard)
- (7) Main body (including the control box, FDD, HDD, and TTL tester interface)
- (8) Alarm lamp pole

4 General Specifications and Requirements

4.1 Acceptable wafer dimensions

- (1) Wafer diameter : $\phi 5''$, $\phi 6''$, $\phi 8''$
- (2) Thickness : 150 ~ 1000 μm
- (3) Thickness variation : less than $\pm 50 \mu\text{m}$

4.2 Acceptable die size

- : 0.25 ~ 100 mm (graduation 0.1 μm)
or 10 ~ 3900 mil (graduation 0.01 mil)

4.3 Indexing time

- : 250 ms (standard speed)
For die size 6 mm, including Z-UP/DOWN
(stroke 0.5 mm) time.

4.4 Total accuracy

- : Within 4 μm
(Taking as reference the die that was
positioned on the lot first wafer, dislocation
of the corresponding die on each of
succeeding wafers must be within $\pm 4 \mu\text{m}$.)
At the ambient temperature change $\pm 1^\circ\text{C}$.

4.5 Probing direction

- : X direction continuous probing
(Y direction probing is possible, too.)

4.6 Chuck Z control

- (1) Control accuracy : $\pm 2 \mu\text{m}$
- (2) Overtravel : 0 ~ 500 μm

4.7 Power supply

- (1) Voltage : 100 VAC ± 10 V, 50/60 Hz
(Usable with 115 or 220 VAC, too.)
- (2) Consumption : Max. 1.5 KVA (including the Hot-Chuck)

4.8 Compressed air supply

- (1) Pressure : 0.4 MPa or higher
- (2) Consumption : Approx. 0.1 NI/wafer (average) (ANR)
- (3) Connection : RC (PT) 1/8 (female thread)

4.9 Vacuum supply

- (1) Vacuum : -53 kPa {-400 mmHg} or lower;
30 l/min. or more
- (2) Connection : RC (PT) 1/8 (female thread)

4.10 Ambient conditions

- (1) Temperature : 25±5
- (2) Humidity : Less than 65% R.H.
- (3) Vibration : Least vibration

4.11 Dimensions and weight

- (1) Width : 1092 mm
- (2) Depth : 1101 mm
- (3) Height : 880 mm (933 mm with the optional Auto card changer)
- (4) Weight : Approx. 800 kg

4.12 Standard accessories

- (1) System disk : 3.5" FD, 1 set
- (2) Data disk : 3.5" FD, formatted 1 pc.
- (3) Hex. wrench : M1.5, 2, 2.5, 3, 4 1 ea.
- (4) Small screwdriver : 1 pc.
- (5) Lamps : For Alignment camera 1 set
- (6) Operation manuals : UF200 1 set

5 Units Specifications

5.1 X/Y axes

- (1) Probing area : Max. ± 120 mm
- (2) Max. speed : 200 mm/sec
- (3) Resolution : 0.5 μ m

5.2 Z axis

- (1) Full stroke : 69 mm
- (2) Standard stroke at probing : 0.5 mm
- (3) Speed : 35 msec/0.5 mm
- (4) Resolution : 0.375 μ m

5.3 θ axis

- (1) Adjustable range : $\pm 5^\circ$
- (2) Resolution : 0.00028 $^\circ$
(approx. 0.5 μ m on 200 mm wafer edge)

5.4 Loader unit

- (1) Wafer handling method : Ceramic arm transfer
- (2) Elevator : 1 elevator (2 elevators in option)
- (3) Acceptable cassette type : Those made on the SEMI standard

5.5 Pre-alignment stage

- (1) Principle : Optical detection
- (2) Accuracy : $\pm 1^\circ$ for flat or notch positioning

5.6 Fine alignment unit

- (1) Principle : Pattern matching with ITV camera
- (2) Illumination : Halogen lamps for coaxial and oblique lighting
- (3) Field of view : Approx. 3.33 x 3.12 mm at Low mag.
Approx. 0.51 x 0.48 mm at High mag.

5.7 Displacement sensor

- (1) Principle : Capacitance sensing
- (2) Resolution : 2 μ m

5.8 Visual microscope (option)

- (1) Type : Stereoscopic microscope with zoom lenses
- (2) Magnification : x 8.3 ~ 29.4
- (3) Field of view : 5 ~ 29.4 mm dia.
- (4) Working distance : 160 mm
- (5) Illumination : Fluorescent lamp

5.9 Markers

- (1) Attaching quantity : Max. 2 pcs. (marker heads - option)
- (2) Marking mode : UP or DOWN marking
- (3) Marking timing : In-place or after-marking
- (4) Marking time : 15 msec ~ 300 msec
- (5) Marking medium : Ink

5.10 Hard disk drive

- (1) Capacity : 540 Mbytes
- (2) Number of drive : 1 drive

5.11 Floppy Disk Drive

- (1) Disk nominal size : 3.5 inches
- (2) Recording mode : 2HD/2DD (compatible to MS-DOS)
- (3) Number of drives : 1 drive

5.12 LCD display

- (1) Screen size : 10.4 inches
- (2) Alignment image displaying color : Black and white
- (3) Character displaying color : 128 colors selected from the full 256 colors
- (4) Character : English
- (5) Number of characters : 80 columns x 25 lines
- (6) Touch switches : 8 x 8 matrix array

5.13 Keyboard

- (1) Key-top size : 15 x 15 mm
- (2) Number of keys : 46 alphanumeric keys

5.14 Alarm pole (three-lamp type)

- Upper lamp; red : Occurrence of an error state
- Middle lamp; yellow : Setup under way, calling the operator
- Lower lamp; green : Automatic operation going on

6 Featuring Functions

- (1) Automatic fine alignment
A model pattern most suitable to the pattern matching operation is automatically searched and registered. This registered model pattern is used for the subsequent wafer alignment.
- (2) Automatic prealignment
An optical sensor is used to detect the orientation flat or notch of each wafer for the wafer prealignment.
- (3) Z-control
On the wafer thickness data obtained with the displacement sensor, the Chuck height is automatically controlled to keep the preset overdrive amount.
- (4) Probing status check with the yield calculation
Probing status can be checked with the in-process yield calculation in addition to monitoring the number of continuous Fail dice.
- (5) Registration of device data
Probing parameters of each device can be stored on the hard disk or a floppy disk. Then, entry of a device name alone can call up all the probing parameters of the device automatically.
- (6) Visual inspection
A tested wafer of every specified number of wafers is sent to the inspection wafer tray where the operator can take it out for the visual inspection.
- (7) Marking
In addition to the in-place marking, the after-marking can be applied.
- (8) Multi-site probing
2-site simultaneous probing is possible in the standard configuration (optionally max. 64 sites).
- (9) Display
The color LCD display shows messages to the operator. Parameters can be entered interactively with the touch-panel switches and keyboard.

(10) Sampling test

Function to test selected dice on a wafer. Programs can be entered from the keyboard, or can be made by teaching on a sample wafer. Those programs can be stored on the hard disk or a floppy disk.

(11) Wafer mapping

1) Output device

- ① LCD display : Real time wafer map
- ② Printer : After the end of wafer, the map is output when specified .

2) Data items

- ① PASS
- ② FAIL
- ③ Category No. 0 ~ 31

(12) Logging of test results

Test results of each wafer can be saved on a floppy disk.

7 Main Optional Functions

- (1) Needle cleaning (with a cleaning wafer or the cleaning unit)
- (2) X-Y coordinate data, category data interface
- (3) GP-IB interface
- (4) 40 or 80 character/line printer (the 80 character/line printer is installed externally)
- (5) HF test head manipulator
- (6) Visual microscope
- (7) Fail-mark inspection
- (8) Probe-mark inspection
- (9) Wafer ID reading (in the Loader unit)
- (10) Device data change on the ID reading
- (11) Management function for plural devices in one cassette
- (12) Automatic probe-pad alignment
- (13) Hot-Chuck
- (14) Multi-site probing for 3 ~ 64 sites
- (15) Multi-pass probing
- (16) Marking machine function
- (17) Off-site marking
- (18) No. 2 elevator
- (19) Simple light shield function
- (20) Air-cool Chuck (15 ~ 200°C)
- (21) Cold-Chuck (-10 ~ 200°C, -40 ~ 150°C, -55 ~ 150°C)

8 Specifications of Standard Tester Interface

8.1 Signal List

- (1) Connector; HIROSE S-1660A-CA (Prober side)
- (2) Input/output signals

Pin No.	Signal name	Direction		Pin No.	Signal name	Direction	
		Prober	Tester			Prober	Tester
1	TESTER VCC 5V	←		31	TEST START		→
2	TESTER VCC 12V	←		32	WAFER END		→
3	–			33	WAFER COUNT		→
4	TESTER COM			34	LOT END		→
5	–			35	COUNT DISABLE		→
6	PROBER VCC 5V		→	36	PROBER BUSY		→
7	PROBER VCC 12V		→	37	–		
8	–			38	–		
9	PROBER COM			39	MANUAL UNLOAD		→
10	–			40	REJECT UNLOAD		→
11	TEST COMPLETE	←		41	ALIGN REJECT		→
12	–			42	–		
13	Z DOWN	←		43	ON WAFER 1		→
14	TESTER BUSY	←		44	“ 2		→
15	STOP	←		45	“ 3		→
16	CLEANING	←		46	“ 4		→
17	UNLOAD	←		47	“ 5		→
18	–			48	“ 6		→
19	FAIL 1	←		49	“ 7		→
20	“ 2	←		50	“ 8		→
21	“ 3	←		51	LOCATION DATA 0		→
22	“ 4	←		52	“ 1		→
23	“ 5	←		53	“ 2		→
24	“ 6	←		54	“ 3		→
25	“ 7	←		55	“ 4		→
26	“ 8	←		56	FIRST CHIP		→
27	–			57	–		
28	–			58	–		
29	–			59	–		
30	–			60	–		

8.2 Other interfaces

The details of the other interfaces such as X-Y coordinate data or GP-IB interface are described in separate Specifications.

9 Delivery Specifications

9.1 Main body specifications

- | | |
|-------------------------------|---|
| (1) UF200 | 1 set |
| (2) Power supply | 100 V
115 V
200 V
220 V
Other: V |
| (3) Power supply cable | TSK standard, 3 m long
Other: m
(Cable end state) |
| (4) Compressed air junction | Standard; without joint nipple,
with RC1/8" female thread receptacle only
1/4" tube joint
Other: |
| (5) Vacuum supply junction | Standard; without joint nipple,
with RC1/8" female thread receptacle only
1/4" tube joint
Other: |
| (6) JOY STICK drive direction | Same directions as the chuck movement
Opposite directions to the chuck movement |
| (7) Chuck | 205 mm standard Chuck
Other: |
| (8) Loader | One elevator type (standard)
Two elevator type (option) |

9.2 Tester connection

- | | |
|---------------------------|---------------------------------------|
| (1) Using tester | Model:_____ |
| | Maker:_____ |
| (2) Electrical connection | Standard
HF test head |
| (3) Tester interface | TSK standard (TTL)
Cable length: m |

9.3 Optional units

- | | |
|-------------------------|---|
| (1) Hot-chuck (ø200 mm) | Not required
Required |
| (2) Marker | Not required
Required
Model: Q'ty:
Ink capsule ID: mm
Fish line OD: mm
Piano wire OD: mm |
| (3) Tester interface | Not required
Required
GP-IB I/F
X/Y coordinate data, Category I/F |

(4) HF test head manipulator	Not required	
	Required	
Manipulator	Test head weight	50 kg or less 50 ~ 100 kg 100 kg or more
Location	Left	
	Rear	
(5) Visual microscope	Not required	
	Required	
(6) Printer	Not required	
	Required	
		40 characters
		80 characters
(7) Needle cleaning	Not required	
	Required	
		Cleaning unit
		Wafer cleaning
(8) Wafer ID reading	Not required	
	Required	
(9) Off-site marking	Not required	
	Required	
(10) Automatic probe-pad alignment	Not required	
	Required	

9.4 Optional software

(1) Fail-mark inspection	Not required Required
(2) Probe-mark inspection	Not required Required
(3) Device data change by wafer ID	Not required Required
(4) Plural devices in one cassette	Not required Required
(5) 3 ~ 64 multi-site probing	Not required Required

10 External View

