

## Surfscan 6200

It locates, sizes, and counts defects in semiconductor substrate material down to 0.157um at a 95% capture rate and down to 0.09um at an 80% capture rate. The instrument uses laser beam scanning for detecting defect contamination and displays scan results in color-coded wafer maps, histograms, and summaries.

The instrument scans wafers contained in a cassette. Cassettes can be loaded onto the left indexer, right indexer, or both indexers. Cassette configuration can be ( R only, L only, Right to left, Left to right, Sort wafers).

When manually aligning wafers, one of the flats of each wafer should face the front of the cassette. When using a mechanical aligner, the flats should face the rear of the cassette. If wafers get scratched, damaged or mishandled immediately perform cassette calibration.

The instrument communicates with an operator using the Microsoft Windows. To use an application, choose menus or commands displayed in the menu bar, or use keypad commands. The system menu is an icon-based menu. Double click on the application icon to start an application. In the Scan window , the menu bar displays: ID, CASS, AUTO, HOME, SAVE, and PRINT commands.

- Log in, access code is BOSS.
- Double click on the icon of the application to start application.
- Log off the system, to exit the current application.
- The Tencor Instrument banner at the top of the screen contains a disk status. If it is green the database space is available. If it is yellow, free disk or data space is getting low, so it needs to be increased free space. It is red, there is no free space.
- Before scanning:
  - 1 Choose the recipe to be used
  - 2 Load the cassette of substrates onto the right locator
  - 3 Choose scan options

4 Enter a Lot ID, if desired

**Scanning methods:**

One substrate-direct access( cassette) or more( AUTO)

**Scanning options:**

1. automatic or manual operation
2. scan sequence
3. microscope hold for MicroViewing

**The recipe sets:**

- 1 Primary data of interest ( defect or haze)
- 2 Initial data displays (map or histogram or both)

**Using the summary box:**

LPD- the total of all light point defects and their total surface area

Bins (1-8)- Bin splits intervals and the count of LPDs for each bin

Mean-the mean of collected LPDS

Std Dev-the standard deviation of collected LPDs

Area Count –The count of all areas( areas and scratches) on the substrate and the their total surface area

Scratch Count-The total number of scratches and their total surface area

Sum of all defects-The sum of all LPDs and areas, including scratches

Haze Region-The percentage of the measurable surface area containing haze

Haze average

Haze peak

To add the comment in the summary screen, press the minus key on the keypad or the minus button ( Top left corner)

A LPD histogram plots the LPD count versus LPD diameter or cross-sections specified in the recipe. A haze histogram plots the number of defects versus haze values. Defect histograms display a red total area bar at the right.

- 1.Using the histogram

**Zooming the histogram-allowing you to narrow the data range**

Can be done using keypad or using the mouse (double click-left

button and two markers will appear)

2. Using the wafer map-locating defects and dimensions of the LPD  
**You can magnify( zoom) the wafer map, apply user defined coordinates to the map(X-Y coordinate option required), and MicroView an area of the wafer.**

To magnify( zoom) a map- double click the left button in the map

3. Examining a microview

Allows to examine a three dimensional representation of the surface of the substrate

To display a MicroView- press microscope, scan the substrate, double click the left mouse in the map, press zoom. The instrument displays the panning window and magnifies the map. Move the panning cursor to the area of interest, then press microscope.

To view the Micro View in full-screen, press ZOOM

### **RECIPES:**

A recipe name can be up to 19 characters long, and can contain any combination of alphabetic, numeric, or special characters.

Load- open and load a selected recipe

View/Modify – to view or change the recipe

New- create a new recipe

Save- save the recipe using the current recipe name

Save as- save the current recipe using a new name

Delete- delete the recipe

Recipe can be created, modified or viewed by opening the Recipe dialog box from the Scan or Setup applications

### **Recipe parameters:**

1.data collection parameters

substrate diameter~125mm

Edge exclusion~ excluded from scan results, min=1mm. max=1/2 of wafer diameter

Gain/Max size- gain determines the range of data collected during a scan. For Surfscan 6200 gain is value from 1-8. (For value=1, size=63um or 250um<sup>2</sup>; Max: For value=8, size=0.12um

or 0.005um<sup>2</sup>). When you change Gain, the instrument automatically sets Area From to Max Size.

Threshold specifies the smallest LPD size to be included in the scan results

Throughput- the speed at which the wafer is processed through the instrument: High, medium, normal, low.

**Area From**-this value determines the LPD size above which the instrument classifies LPDS *as areas*

**LPD count**- the max number of light particle defects allowed( 0-99999)

**LPD/cm<sup>2</sup>**- Number of LPDs allowed per square centimeter (wafer #3:  $417/((4.6*4.6)*3.14)=417/66.44=6.27\text{cm}^2$

**Area count**-total number of areas allowed ( areas+ scratches)

**Area mm<sup>2</sup>**- total of all areas allowed in mm<sup>2</sup>

Scratch count-number of scratches allowed in mmm

**Scratch mm**-Selecting substrate parameters:

- Edge exclusion=4mmm
- Choose the select button at the bottom left of the recipe dialog box-to select a new substrate and thickness
- T (Tencor Instruments supplied calibration curve is used)
- C (Customer supplied calibration curve is used)

*The instrument collects defects and haze data from a wafer by illuminating the wafer surface with a laser beam, collecting the scattered light through an optics system, and amplifying the scattered light with a photomultiplier tube(PMT). The gain of the PMT determines the dynamic range for collecting data.*

Selecting an LPD range

To specify the LPD range, use Gain, Threshold, and Area From parameters. The gain setting determines the maximum LPD size of interest, the threshold determines the smallest LPD collected during a scan. Using a combination of gain and the threshold settings, you can scan for a broad or narrow band of LPDs.