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## MicroSense Semiconductor Wafer Gages

### SUMMARY

MicroSense Semiconductor Wafer Gaging Stations measure wafers for Thickness, Total Thickness Variation (TTV), Flatness, Bow, Warp and Resistivity. MicroSense Gaging Stations are used in research laboratories, quality control, and production areas for product monitoring. ADE's MicroSense instruments are the industry standard. All series 6000 Wafer Gaging stations use ADE's patented non-contact measurement techniques to assure accurate, precise and repeatable data.

### MicroSense 6033T

The Model 6033T, using ADE's patented capacitive measurement principle, measures wafers for Thickness and Total Thickness Variation (TVV). Whenever semiconductor wafer inspection is required, the MicroSense Model 6033T offers a low cost method of achieving fast, accurate measurements on wafers up to 150mm in diameter.

#### Features

- Non-contact
- Low cost
- All-electronic gaging
- Fast set-up
- Easy operation
- Thickness, TTV

### MicroSense 6034

The Model 6034 measures wafer Thickness, Total Thickness Variation (TTV), Flatness, Bow and Warp. This system incorporates a similar capacitive measurement technique as the 6033T and is typically used in quality control and wafer processing areas to measure wafers up to 200mm in diameter.

#### Features

- Non-contact
- Accurate
- Digital display

- Wide operating range
- ASTM standard
- Thickness, TTV
- Flatness, Bow and Warp

### **MicroSense 6035**

ADE's Model 6035 uses non-contact eddy-current probes to accurately measure Bulk Resistivity of wafers. This MicroSense system handles wafers up to 150mm in diameter, and is useful in the laboratory for materials research or on the production line for quality, process control, and yield analysis.

#### **Features**

- Non-contact
- Accurate
- Digital display
- Temperature compensation
- High or Low Resistivity

## **SPECIFICATIONS**

### **MicroSense 6033T**

**Measurement:**  $\pm 0.010''/250$  microns around set-up thickness.

**Accuracy:**  $\pm 0.0001''/2.5$  microns (within  $\pm 0.002''/50$  microns of nominal master).

**Repeatability:**  $\pm 0.00005''/1.3$  microns.

**Stability:**  $\pm 0.00005''/1.3$  microns (typical) for 24 hours at constant temperature.

#### **DISPLAYS**

**Thickness:** Digital, 4-digit  
 Resolution (last digit)  
 English: 0.00001 inch  
 Metric: 0.1 micron  
 Measurement Speed: 5 per second

**Hi/Lo Lights:** Illuminates if measurement exceeds present limits.

**Overrange:** Illuminates if dynamic range is exceeded, or when water is removed from fixture.

#### **POWER REQUIREMENTS**

115  $\pm$  15 VAC, 50-60 Hz Standard

230  $\pm$  30 VAC, 100  $\pm$  10 VAC Optional

#### **DIMENSIONS**

**Footprint:** 9.5 H x 9.4 W x 10.3 D inches  
 24.1 H x 23.9 W x 26.2 D cm

**Shipping weight:** 25 lbs/11.3 kg approx.

### **MicroSense 6034**

#### **RANGE**

**Thickness:** 0-1000.0 microns, 0-40.00 mils

**TTV, Warp, Bow:** 0-250.0 microns, 0-10.00 mils

**Accuracy:**  $\pm 2.5$  microns, 0.1 mils

**Precision:** 1.3 microns, 0.05 mils (1 sigma)

**Resolution:** 0.1 micron, 0.01 mils

**Wafer Rings Parallelism:** 1.3 microns, 0.05 mils

**Flatness Precision:** 1.3 microns, 0.05 mils

**Limits:** User settable high and low with front panel LED indication of high or low out of range condition.

#### **POWER REQUIREMENTS**

115 ± 15 VAC, 50-60 Hz Standard

230 ± 30 VAC, 100 ± 10 VAC Optional

#### **DIMENSIONS**

**Standard Base Footprint:** 18 L x 14 W x 3 D inches

46 L x 36 W x 7.6 D cm

**200mm Base Footprint:** 24 L x 20 W x 3 D inches

61 L x 51 W x 7.6 D cm

**Shipping Weight:** Standard model – 190 lbs./86 kg

200 mm model – 400 lbs./182 kg

#### **MicroSense 6935**

**TMA Gap:** 0.040"/1 mm minimum-standard. TMA input/output via plug-in cable.

**Wafer Thickness:** 100 to 750 microns

#### **DISPLAYS**

**Reading:** 3.5 digit, autoranging

<b>Range (Ohm-cm)</b>	<b>Resolution (Ohm-cm)</b>
0.10-0.1999	0.0001
0.200-0.999	0.001
0.10-19.99	0.01
20.0-99.9	0.1

**HI/Lo Lights:** Illuminates if measurement exceeds preset limits.

**Overrange:** Illuminates if dynamic range is exceeded; blinks if too thick wafer is used.

**On/Off:** LED

**Thickness Input:** LED blinks on momentarily to signify command received to acquire external thickness input.

#### **POWER REQUIREMENTS**

115 ± 15 VAC, 50-60 Hz Standard

230 ± 30 VAC or 100 ± 10 VAC Optional

#### **DIMENSIONS**

**Footprint:** 9.5 H x 9.4 W x 10.3 D inches

24.1 H x 23.9 W x 26.2 D cm

**Shipping Weight:** 25 lbs./11.3 kg approx.

#### **MicroSense 6034**

The MicroSense 6034 is a stand-alone gaging station for measuring wafer Thickness, Total Thickness Variation (TTV), Flatness, Bow and Warp. Two configurations of the model are available. One measures wafers from 2" to 150 mm in diameter, the second configuration includes capability from 2" to 200mm.

The measurements are made by placing the wafer on an optional positioning ring and moving it between the sensors. The operator selects the desired measurement by setting the multi-position front panel switch to the appropriate position.

Thickness is given as a real time measurement. The display is updated 5 times per second. Wafers with thicknesses up to 1000 microns can be measured.

Total Thickness Variation (TTV) is determined by scanning the wafer between the probes. The TTV is the difference between the largest and smallest thickness measurements made during the scan. TTVs up to 250 microns are displayed directly on the digital readout. This measurement conforms to ASTM standard F657.

Bow, or the centerpoint deflection of the wafer, is measured by placing the wafer onto a wafer ring and positioning it over the lower probe. The reading is taken. The wafer is turned over and the same center-point position is measured. The difference between the readings is divided by two to get the centerpoint Bow. It is also possible to determine whether the centerpoint Bow is due to a concave or convex condition.

Warp is the numeric representation of the shape of the wafer. It is measured with respect to the reference plane created by the pins of the wafer ring. Warp is given for the center-line (the general shape of the wafer) or for the top or bottom surface. The measurement is made in the same manner as TTV, per ASTM 657.

Wafer rings are required for Flatness, Warp and Bow measurements. Three contact points on the wafer ring define a reference plane for determining surface variation. The base surface of the ring is ground flat and parallel to the reference plane. Three locator pads keep the wafer centered and prevent the wafer edge from mechanical damage.

The vacuum chucks, made of hard-coated aluminum, are used with compatible wafer positioning rings for Flatness measurements. Both vacuum chucks and wafer rings are available in a variety of sizes. Additionally, a kit including NIST traceable masters from 250 to 760 microns is available to simplify calibration checks.