

## Instrument Description

The AutoEL II is designed to be an affordable, high performance ellipsometer, providing an easy-to-use approach to accurately measuring a wide variety of films. The system's keyboard addresses an internal microprocessor, which automates system operation and quickly reports delta and psi on a front panel display. These quantities can be reduced to the physical quantities of thickness and refractive index when using the optional data reduction software, which can run on a PC that can be interfaced directly via the standard RS232 serial port.

### Auto EL II Specifications

#### **Operating Principle:**

Null seeking

#### **Operating Wavelength:**

632.8 nm

#### **Light Source:**

HeNe Laser ( Standard AutoEL II only )

#### **Resolution and Accuracy:**

Polarizer or analyzer 0.05°

Delta 0.1°

Psi 0.05°

Resolution and accuracy of measured film thickness and film or substrate refractive index depends on the film-substrate system and the film thickness. Accuracy of 3 to 10 Å and 0.01 refractive index units are typical for silicon oxide films on silicon.

#### **Angle of Incidence:**

Standard pin locations 70° ± 0.02° and 90° ± 0.02°

Optional pin locations 60° to 80°

Optional pin locations are available at additional cost. Non-pin located angles may be set with specially cut alignment prisms.

#### **Measuring Time** (No calculations):

Typical 12 seconds

Maximum 60 seconds

#### **Display:**

The system displays delta and psi as well as prompting messages to the operator.

## AutoEL II

#### **Digital Output:**

Serial ASCII, RS-232

#### **Maximum Sample Size and Mounting Plane:**

6" x 6" (15.2 cm x 15.2 cm). Horizontal with vacuum holddown. Vacuum source is not supplied.

#### **Sample Stage:**

The standard sample stage can be moved vertically. It can also be tilted about the ellipsometric vertex and about the plane of incidence with the plane of the sample.

#### **Autocollimator/Microscope:**

The Autocollimator/Microscope provides the ability to conveniently switch between the autocollimator, which provides precise and easy sample alignment, and the microscope function. The microscope provides a 4 mm field of view, 40x magnification and cross hairs for locating the measurement area.

#### **AutoEL II Performance:**

#### **Thickness Range:**

10 Å to 3.0 µm

#### **Repeatability:**

≤1 Å or 1%, Whichever is greater

#### **Accuracy:**

±3 Å (Compared to NIST wafers)

±0.005 (Refractive index)

#### **AutoEL II Film Thickness Applications:**

SiO<sub>2</sub>/Si

Si<sub>3</sub>N<sub>4</sub>/Si

Resist/Si

Si<sub>3</sub>N<sub>4</sub>/SiO<sub>2</sub>/Si

Resist/SiO<sub>2</sub>/Si

Polysilicon/SiO<sub>2</sub>/Si

Thin metal film

Organic films

Glass, GaAs, Metal

SiO<sub>2</sub>/polysilicon/SiO<sub>2</sub>/Si (3-wavelength models only)

Resist on CD masters

n and k of read/write heads



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AEII 797  
Printed in USA

<u>Part Number</u>	<u>Wavelength</u>	<u>Available Options</u>
<b>AutoEL II</b>		
A7905	633 nm	2, 2C, 4C, 5A, 5C, 6, 7, C9523, C9467, DAFIBM, VVS-1

<u>Part Number</u>	<u>Options</u>
2	X-Y Sample stage
2C	150 mm Sliding sample tray
4C	Microspot optics (25 $\mu$ m x 75 $\mu$ m)
4D	Microspot optics (100 $\mu$ m x 300 $\mu$ m)
4E	Microspot optics (30 $\mu$ m x 90 $\mu$ m)
5A	Single layer data reduction software
5C	Thermal printer
6	70° Alignment prism
7	60° & 80° Angles of incidence
C9523	12 in. Diameter manual rotary stage
C9467	15 in. Diameter manual rotary stage
DAFIBM	Ellipsometric data reduction software
VVS-1	Video viewing system

### **SPECIAL CONFIGURATIONS**

In addition to the single wavelength HeNe laser based AutoEL II system, Rudolph offers four extended wavelength versions of this popular, low cost ellipsometer. These special systems can automatically measure delta and psi at each of the three wavelengths, and like the single wavelength system, data reduction can be performed using external PC ellipsometric data reduction software. In addition, these systems have the ability to measure multi-layer films. Repositioning the polarizer and analyzer, which are color coded for easy use, enables the user to change wavelengths. For special applications, such as measuring the n and k of disk heads or media, other wavelengths are available.

<u>Part Number</u>	<u>Wavelength (s)</u>	<u>Available Options</u>
<b>AutoEL II-3W</b>		
A9819	405, 546, 633 nm	2, 2C, 4D, 4E, 6, 7, C9523, C9467, DAFIBM, VVS-1
<b>AutoEL II-NIR-1</b>		
A9820	633, 790, 830 nm	2, 2C, 4D, 4E, 6, 7, C9523, C9467, DAFIBM, VVS-1
<b>AutoEL II-NIR-2</b>		
A9821	790 830, 850 nm	2, 2C, 4D, 4E, 6, 7, C9523, C9467, DAFIBM, VVS-1
<b>AutoEL II-NIR-3</b>		
A9822	405, 633, 830 nm	2, 2C, 4D, 4E, 6, 7, C9523, C9467, DAFIBM, VVS-1

### **Power Requirements:**

Domestic:

115V  $\pm$  10V 50/60Hz 130VA

Export:

100V  $\pm$  10V 50/60Hz 130VA

Export:

220V  $\pm$  20V 50/60Hz 130VA

Installation and training are provided at customer's site by factory trained technicians.

### **Limited Warranty on New AutoEL Systems**

**A.** Rudolph Technologies agrees to correct, either by repair or replacement, any defect of material or workmanship that develops within one year after shipment of the AutoEL to the original purchaser, provided that the instrument is returned to the factory in accordance with packing and shipping instructions obtained from Rudolph Technologies, and provided that investigation by Rudolph Technologies discloses that such defects developed under normal and proper use. The conditions of Par. 1-1B are part of this warranty.

**B.** All items claimed defective must be returned to Rudolph Technologies, transportation charges prepaid, and will be returned to the purchaser with the transportation charges collect unless the defect is found to be covered by the warranty, in which case Rudolph Technologies will pay domestic transportation charges for return to the purchaser. Rudolph Technologies shall be released from all obligations under this warranty in the event repairs or modifications are made by persons other than its own service personnel, unless such repairs by others are made with the written consent of Rudolph Technologies. Rudolph Technologies expressly disclaims any liability for special or consequential damages of any kind and from any cause whatsoever arising out of or in any way connected with the manufacture, sale, handling, repair, maintenance or replacement, or arising out of, or in any way connected with, the use of our products. This warranty is in lieu of all other warranties expressed or implied, including, but not limited to, implied warranties of merchantability or fitness for a particular purpose. Rudolph Technologies neither assumes, nor authorizes any other person to assume for us, any other liability in connection with our products. Any changes in this warranty must be in writing and approved by an officer of the company.



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**RUDOLPH**  
Technologies, Inc.

One Rudolph Road  
PO Box 1000  
Flanders, New Jersey 07836  
Tel: 973.691.1300  
Fax: 973.691.5480  
<http://www.rudolphtech.com>  
E-mail: [info@rudolphtech.com](mailto:info@rudolphtech.com)