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SYSTEM ONE, MODEL 303
SINGLE WAFER ETCHER

General Description

The Matrix® Model 303 represents the Industry Standard in single-wafer downstream isotropic etching and a mainstay of the highly successful System One family. Developed in cooperation with many of the world's leading IC producers, the Model 303 has been designed for optimum performance and Cost of Ownership.

The Model 303 provides high throughput in a single wafer system capable of handling wide variety of etch processes and substrates ranging from 75mm up to 150mm. By maintaining independent closed-loop system controls, the system optimizes for these process parameters:

- Isotropic Etch Profile
- Excellent selectivity control
- Replacement of Wet Etch Processes
- Low total Gas flow
- Low Cost of Ownership

These benefits are coupled with exceptional reliability proven in more than 700 System One installations worldwide.

Applications

Downstream Etching

- Polysilicon
- LPCVD Si3N4
- PECVD Si3N4
- PECVD Oxide
- TEOS
- BPSG
- BCB etch planarization
- Photo BCB Clean / Descum
- SiChrome Etch
- PAD Stack Etch
- ASM Alignment Mark Etch
- 'Wine Glass' Oxide Etch
- Uniformity capability (<5% 1σ)



The Matrix Model 303 is available free-standing (as shown here) or in a through-the-wall configuration

Features/Benefits

Single Wafer, Multi-Step Processing

- Precisely controlled & repeatable etching of each wafer
- 3 programmable steps + overetch
- Low gas flow, typically <150 sccm

High Throughput

- >45 WPH on 150mm 1μ Si3N4 etch (40 second process time)

Aluminum Wafer Chuck
Provides uniform temperature profile

Low Particles
<0.1 particles (>0.3μm) added per cm^2

Proven System Performance
>700 System Ones in use worldwide,
>120 Model 303 etchers in use
>95% uptime

Proven Reactor Design
Optically dense and mechanically robust dual aluminum grid assembly provides separation of wafer from plasma for true "downstream" performance.

Closed-Loop Temperature Control
Resistively heated and TCU cooled wafer chuck, stable range for etch: 25°C - 80ºC (+/-5°C) with TCU, provides precise temperature control.

3 Mass Flow Controllers
Three MFC's for reliable gas control for most applications. 4th MFC option.

Photocell Endpoint
Automatic endpoint detection for optimizing throughput.

Pick-and-Place Wafer Handling
Brooks Orbitran® system, cassette to cassette wafer handling

Production Oriented
Easy to learn, one-button operation
Process recipe stored on magnetic card

System Diagnostics/Modularity
Maintenance is quick and simple

Small Footprint
Only 25" W x 28" D (63.5cm x 71cm)

Process Module Features

Reactor
Patented aluminum / ceramic chamber and aluminum wafer chuck

Wafer Sizes
Handles 100mm, 125mm, 150mm Silicon or GaAs wafers.
Optional capabilities for
- 75-150mm GaAs wafers
- 75mm InP wafers

Gas Control
Three independent gas sticks standard. 200, 100, 100sccm (4th MFC option)

Substrate Positioning
Processing of substrate directly on heated wafer chuck

Pressure Control
Accurate, closed-loop pressure control with "butterfly-style" throttle valve and capacitance manometer

Operator Controls
- Start/Stop
- Function control switches (multi-purpose)
- Independent control of pressure, RF power, temperature, gas flow and substrate position through a three-step process program, with over etch step
- Magnetic card reader for process installation and recording
- Process parameters transferable between machines by magnetic card
- Emergency Off (EMO)

Display
Dot-matrix plasma display, 3.7"H x 7.5"W
Menu-driven process displays
Built-in diagnostics

Control Systems
Microprocessor control of the following:
- Gas flows: settings for up to 3 independent mass flow controller values, (optional 4 MFC version)
- RF power: 50 to 320 watts
- Process pressure
- Absolute endpoint time
- Timed overetch
- Temperature setpoint
- Wafer pins up/down
- Optical Endpoint Parameters

Power Supply Module Features

Location
Usually stacked below Process Module and within 3 feet (1 meter) from vacuum pump, depending on facility vacuum system and plumbing

Controls
EMO
Main power on/off
Reset

Circuit Breakers
AC main
DC supply
Vacuum pump
RF generator
Temperature control module

Physical Specifications

Process Module
25"W x 28"D x 21"H
(63.5cm x 71.1cm x 53.3cm)
Weight: 100lb (45 kg)

Power Supply Module
25"W x 28"D x 35"H
(63.5cm x 71.1cm x 88.9cm)
Weight: 310lb (140kg)

Facility Requirements

Process Module

CF4 / NF3:	Up to 100sccm
O2:	0-100sccm
Helium:	0-150sccm
Dry nitrogen:	80psi house supply; filtered
Cooling water:	2 GPM house circulating supply @ <23 ± 2°C for baseplate cooling
Facility Exhaust:	100 CFM @ 1" static pressure

Power Supply Module

Power:	190-240VAC, single phase, 30A, 50/60Hz, NEMA L-6-30P plug supplied
Cooling water:	2 GPM house circulating supply @ <23 ± 2°C for RF Generator cooling

Process Vacuum
Min. pump speed 26 CFM

24-Month Warranty

Installation assistance at your facility

Remedial maintenance
Covers parts and labor, excluding consumables, for any original manufacture problems

Updates and Upgrades
Automatic updates to manuals and tech bulletins plus standard system and software enhancements during warranty period

Maintenance and service agreements
Available to extend service coverage after warranty

Options

Vacuum Pump Customer recommended to provide.

CE Compliance: Immunity EN 50082-2 1995 and Emission EN 55011:1991

UL 1262 Electrical Certification

Spare Parts Kits

4th MFC gas stick

Process Module Mounting Brackets

Temperature Control Unit (Chiller)
1 **Required** for the Model 303 for closed loop temperature control of wafer chuck.
2nd TCU in lieu of house cooling water as defined in Facility Requirements, provides closed-loop cooling of RF power supply and chamber baseplate. Customer to provide TCU(s).

***Trinity*™ Graphical User Interface Software**
"External PC" operating control system with Matrix' *Trinity*™ Graphical User Interface Software. Trinity replaces the magnetic card reader for recipe management and provides a PC interface for System 1 Control. (Check with factory for availability)

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