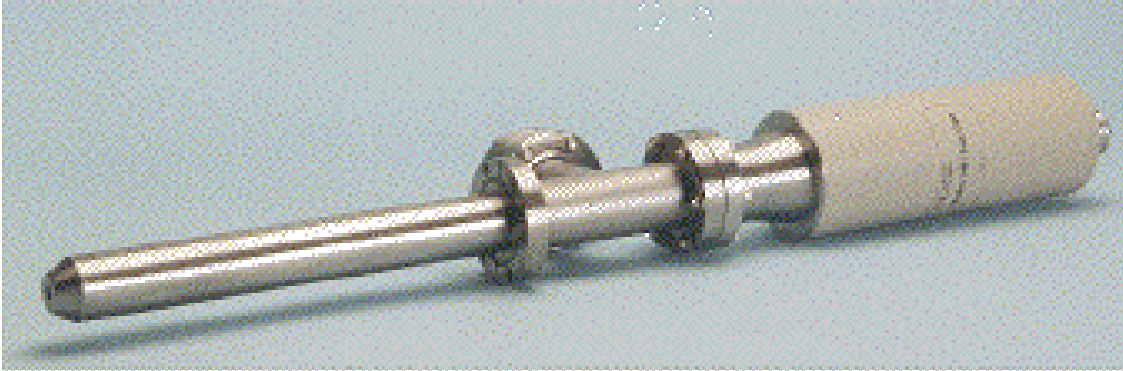


Model 1401 Depth Profiling Ion Source



Design Features

- High current density 15 to 50 mA/cm² depending on spot size selected.
- Unique ion source design for stable emission.
- Dual tungsten filaments with typical filament life-time > 500 hours. Ytria coated iridium optional.
- Replaceable beam trimming aperture with typical life-time > 500 hours.
- All UHV compatible and etch resistant materials used in fabrication.
- Differential pumping to minimize main chamber gas loading.
- Gun is easily disassembled for maintenance.
- Electrical connections and gas inlet located on a single flange for easier installation.
- Preset extraction and condenser lens parameters (three spot size settings) for repeatable operation.
- Integral beam current measurement.
- Direct measurement of ion source pressure.
- System and cable interlocks prevent energizing high voltage with poor vacuum or cable removed.
- Power supply and raster generator in single 5-¹/₄ high 19 inch rack mount enclosure.
- Digitally generated raster option for uniform etch profile.
- Computer control option.
- Optional ion source pressure regulation.

Guaranteed Performance: 5.0 keV kinetic energy Ar ions

Mode	Spot size (μms)	Beam Current	Current Density (mA/cm ²)
Large Spot	400	20 μA	15
Small Spot	50	1 μA	50

Engineering Specification

Working Distance:	25 mm
Beam energy:	$\leq 5\text{KeV}$ continuously variable
Raster Size:	4 x 4 mm (minimum)
Mounting Flange:	70 mm (2.75in) Conflat
Differential Pumping:	70 mm (2.75 in) Conflat
Supply Gas Inlet:	34 mm (1.33 in) Conflat
Source gases:	He, Ne, Ar, Kr, Xe
Bake-out Temperature:	150 °C maximum

System Integration Details

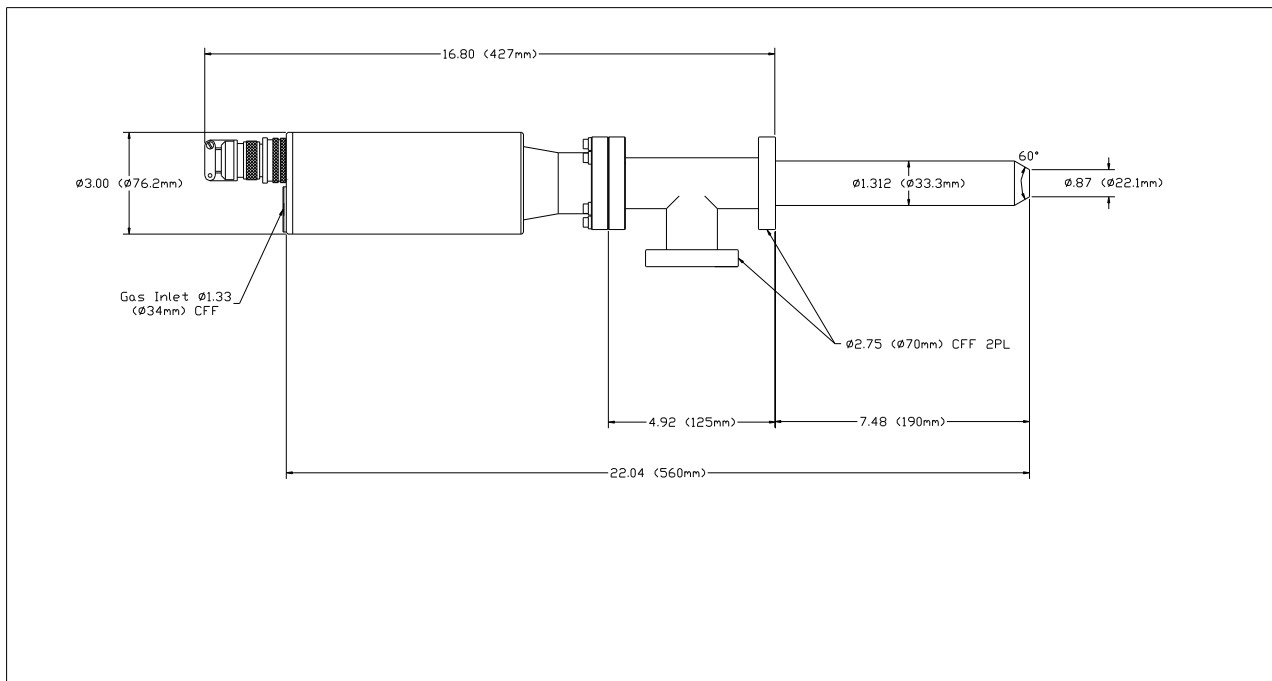
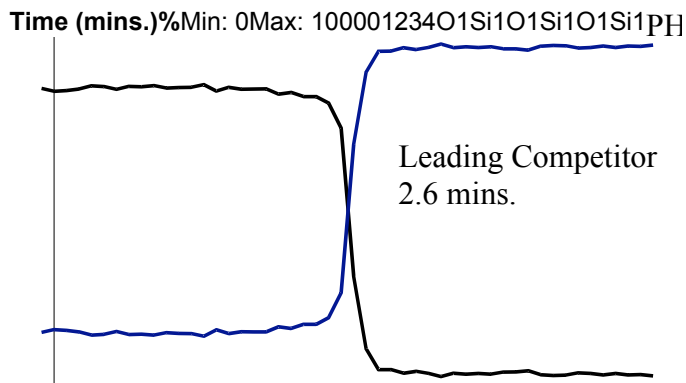
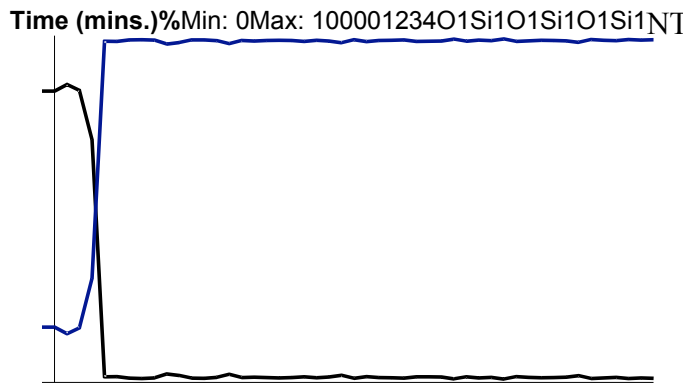


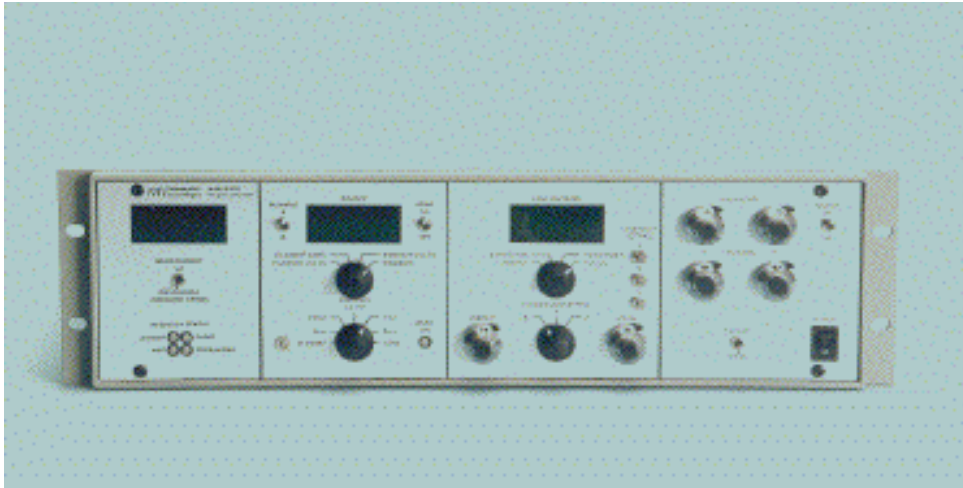
Fig. 1 Model 1401 Ion Gun, Outline Drawing

Etch Rate Comparison



Depth Profiles taken through 1000Å of SiO₂ on Si to demonstrate the advantage in etch rate of the NTI 1401 compared to a leading competitor.

Model 1401A Ion Gun Controller



Controller Features

- Precise and stable lens voltages
- Emission regulated electron impact current supply
- Front panel raster controls with external programmability
- Power interlocks for safety and equipment protection
- Remote On/Off control for automated operation from external equipment
- Raster compensation electronics to correct for changes in sample geometry and working distance
- Comprehensive front panel system parameter monitoring

Controller Specification

Input Power:	115/220 volts AC auto-select operation. Fused at 3.3 Amperes.
Beam Energy:	0 - 5000 volts switch mode supply continuously variable. O/P current: 1 mA maximum. O/P capacitance: 0.0047 μ F.
Condenser:	0 - 5000 volts switch mode supply continuously variable. O/P voltage scales with Energy. O/P current: 1 mA maximum. O/P capacitance: 0.0047 μ F
Objective Focus:	0 - 5000 volts switch mode supply continuously variable. O/P voltage scales with Energy. O/P current: 1 mA maximum. O/P capacitance: 0.0047 μ F
Filament Power:	Emission regulated supply with front panel selectable filaments providing 5 volts @ 5 Amp. maximum.
Electron Impact	Internally adjustable accelerating voltage and emission current front panel metering.
Ion Extraction:	Internally adjustable to 1500 volts.
Faraday Collector:	Front panel momentary switch permits beam current monitoring through panel mounted display.
Deflection:	Variable bi-polar 350 volt dc supply for +X, -X, +Y and -Y deflection. Remaining octupole elements are supplied from a resistive divider network.
Interlocks:	HV cable disconnection turns off HV supplies. Adjustable high pressure interlock switches off HV supplies in the event of system overpressure. System and Auxiliary interlocks provide total shutdown in the event of system or auxiliary equipment failure.
Front Panel Monitoring:	Digital panel meters provide precision monitoring of all critical parameters including; lens voltages ($4\frac{1}{2}$ digit), ion source pressure and beam current ($3\frac{1}{2}$ digits), filament current and voltage ($3\frac{1}{2}$ digits), emission current ($3\frac{1}{2}$ digits).
Chassis Dimensions:	483(w)x132.5(h)x435.4(d) mm. 19 inch rack-mountable desktop case 3U high.