

ELITE ETCH

Automated Dual Acid Decapsulator

- *innovative software*
- *dynamic etch time adjustment*
- *multiple acid rinse options*
- *smallest footprint*



THE TECHNOLOGY -

Automated Acid Decapsulation was invented and patented by Dr. Ben Winsick more than 25 years ago. Dr. Winsick moved from the Netherlands to join National Semiconductor in Santa Clara, California during this period.

From his pioneering approach to IC package decapsulation until now there have been only a few minor improvements, but no real breakthroughs in decapsulator design - until now.

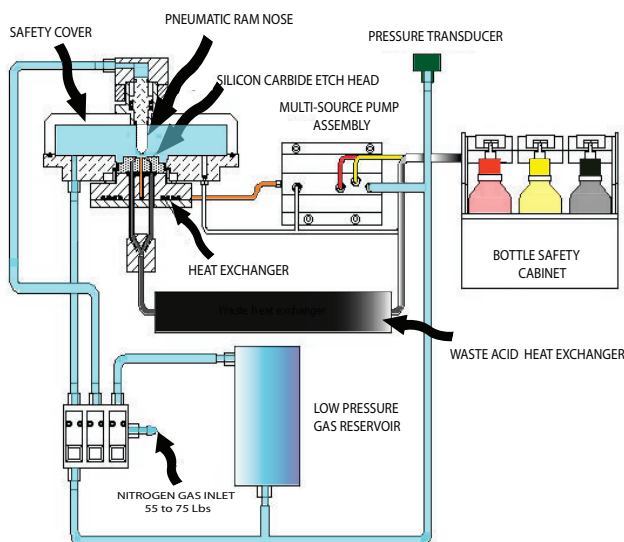
The Elite Etch from RKD Engineering is an Automated Mixed Acid Decapsulator that enables high productivity through the integration of advanced features, made possible by the use of modern materials and design concepts. RKD's Elite Etch Decapsulator rapidly and easily opens even the most delicate packages by delivering precise, micro aliquots of nitric, sulfuric, or mixes of these acids to the package with no sample damage.

The RKD Elite Etch Acid Decapsulator incorporates many engineering innovations. A monolithic etch head assembly machined from premium grade silicon carbide is used for unsurpassed acid resistance. Coupled with an active nitrogen gas monitoring and purge system this monolithic design reduces the fuming of any residual acids left on the etch head after a decap process - a common problem with less sophisticated designs. Our choice of monolithic silicon carbide also enables short heat-up times.

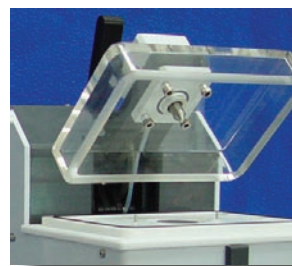
This is achieved by using a low thermal mass etch head design. Other manufacturers use high thermal mass designs and complex interchangeable components such as removable etch head inserts that are fraught with unreliable performance characteristics. Our simple, yet effective design greatly reduces cleaning and clogging of the etch head and its surrounding areas.

The device hold down assembly (ram nose) is manually activated and is designed for a large amount of travel. The ram nose is normally retracted and only extends *after* the safety cover is fully closed. The vertical movement of the ram nose secures the device to the etch head thereby eliminating movement of either the package or its fixturing.

The safety cover is closed and opened manually at the beginning and end of each etch process. Closing the safety cover starts the programmed etch sequence. Opening the safety cover will stop all etch processes. All acid line connections to the etch plate are made with radially symmetrical compression joints to eliminate troublesome high temperature seals.



ELITE ETCH - Schematic of System plumbing



ELITE ETCH -

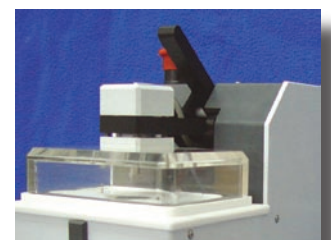
Safety cover open to shown ram nose linear motion of travel that eliminates the possibility of package/gasket movement so often found in other systems where the ram travels through an arc

ELITE ETCH -

Safety cover closed, to show closure onto RKD's cover seal that eliminates the

SAFETY COVER ERROR

problem so frequently found in less sophisticated designs. The emergency off EMO can also be seen on the top plate cover



VERSATILE SYSTEM CONFIGURATION -

HANDHELD KEYPAD -

Operational simplicity results not only from RKD's software that continually checks and protects the system against operator error, but control from the Handheld Keypad is simple and intuitive. Anyone who can use a mobile phone can run an Elite Etch Decapsulator.

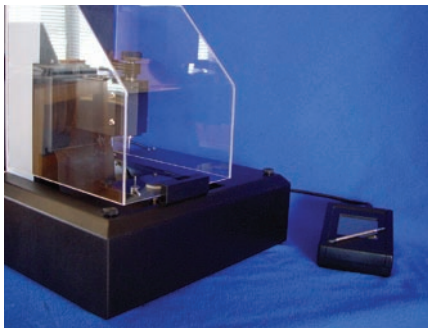
Fume Hood space is always at a premium so we have designed the smallest footprint in the industry while enhancing every possible safety feature. The incorporation of a separate heat exchanger for cooling waste acid below 90°C permits this size reduction - now we only need a single waste bottle!

LookAhead software eliminates the danger of waste bottle overflow by preventing operation of the Elite Etch if the waste bottle does not have sufficient space in it for the programmed etch process to complete

RKD Engineering is the only company to incorporate real double containment for all fluid couplings between the bottle container and the decapsulator. Interconnects are run inside Teflon containment tubing that can be fed from either side of the Bottle Box. The Bottle Assembly contains a fluid sensor to alert the operator in the event of acid leak from any of the bottles. The Elite Etch Decapsulator can use either US standard 500 ml. bottles or Japanese bottles.

FIXTURES and ACCESSORIES -

Elite Etch can use all the accessory kits, gaskets and alignment plates supplied by B&G International (Nisene Technology Group). However, for significant cost savings and the advantage of always having the ability to design and cut gaskets and plates for each and every package type, we recommend the μ Mill from RKD Engineering. This Mill is simple to operate, requires no knowledge of Machinists G Code and can rapidly manufacture both definition and pocket (monolithic) gaskets from high quality, acid resistant AFLAS copolymer materials.



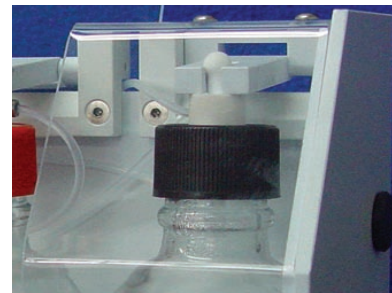
Manufacture all your own gaskets & fixtures; Precavitate packages, remove Heat Sinks; Remove Die Flags, Perform Selected Area Mechanical Decapsulation. Add the **NanoPrep** system to perform backside die thinning & polishing for IR and emission microscopy



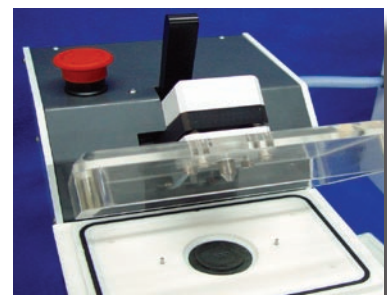
Bottle Box Assembly showing system configured for US standard bottles.

SYSTEM SAFETY -

Bottle exchange on any decapsulator involves possible risk to the operator. To minimize this we have incorporated a universal pivoting interconnect that allows simple and trouble free bottle exchange. The universal pivot assembly is shown below in detail in addition to the bottle venting system to prevent fuming of acids in the bottle box



Universal Pivot Joint Bottle Connector for either Japanese or US standard bottles (as shown)



EMO location on top plate of etcher. The Elite Etch can be shut down via EMO with no damage to any internal components.

ELITE ETCH SYSTEM SPECIFICATION -

GENERAL SPECIFICATION -

Dimensions - (w x d x h)

<i>Decapsulator</i>	7.5 x 12.5 x 12 inch 190 x 318 x 305 mm
<i>Bottle Assembly</i>	10 x 5 x 11 inch 254 x 127 x 279 mm

Weight -	approx. 35 lbs.(16 Kg)
Gas Pressure	70 psi. (N ₂) or CDA
Power Source	90 to 250 VAC
Acid temp. range	20°C to 250°C
Acid temp. set point	1.0°C ± 0.1°C
Etch cavity (up to)	22 x 22 mm

SOFTWARE OPERATIONAL SPECIFICATION -

acid selection - fuming or concentrated sulfuric acid
fuming or concentrated nitric acid
mixed acids

NOTE: All mix ratios are dynamically prepared within pumping assembly

acid mix ratios - (nitric to sulfuric ratios)
9:1, 5:1, 4:1, 3:1, 2:1, 1:1

post etch rinse options - fuming sulfuric acid
fuming nitric acid
mixed acids
no rinse

NOTE: Acid rinse temperature settings are automatically calibrated to etch temperature

etch times - 1 to 1,800 seconds, in 1 sec. increments

NOTE: Etch time can be dynamically adjusted during etch process

etch modalities - (i) Pulse Etch,
(ii) Reciprocating Etch - Acid Pulsation

NOTE: REAP is a superior approach to maximizing the carrying capacity for the etch acid(s) within the package volume. It allows superior etch characteristics when nitric acid or mixed acids are selected.

etch temperature ranges - 20°C to 90°C (nitric acid)
20°C to 250°C (sulfuric acid)
20°C to 100°C (mixed acids)

etchant volume selection - 1 to 6 ml. per minute for all acids and acid mixes.

operator program storage - 100 programs -
stored to non-volatile memory

software upgrades - (i) via RS232 or USB computer link
(ii) Hand Held Replacement



Backlit Handheld Keypad Control for Elite Etch Decapsulator showing RS232 PC connection to PC

SAFETY DESIGN FEATURES -

EMO Emergency Power Off Switch

Etch Head Safety - over temperature sensor circuitry

Leak Detection Sensors - (i) Decapsulator Body
(ii) Bottle Box Assembly

Secondary Containment - *Real* Secondary Containment

Acid Fume Reduction - Waste Acid Heat Exchanger to minimize acid fuming

CERTIFICATIONS & INDUSTRY COMPLIANCE -

RoHS WEEE
CE
SEMI S-2
SEMI S-2, 93

SYSTEM MAINTENANCE -

Routine system maintenance of the Elite Etch is simplicity itself. By selecting maintenance routines from the handheld keypad controller most maintenance routines can be run, including -

- Temperature Calibration
- Optical Sensor Calibration
- Valve operation
- Ram Nose operation
- Low pressure gas supply and vent functions

Elite Etch uses no pressure regulators at all, it just connects directly to a nitrogen gas line

WARRANTY -

Subject to RKD Engineering's Standard Terms and Conditions of sale. All parts are warranted for a period of twelve (12) months to be free of defects in material and workmanship when used under normal operating conditions and when recommended preventative maintenance is properly performed.

LEFT COAST INSTRUMENTS

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