

ASAP-1[®] IPS

Digital Preparation System

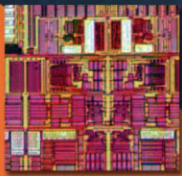
Selected Area Decapsulation, Substrate Thinning & Polishing

SIFT

Emission Microscopy

XIVA

FA

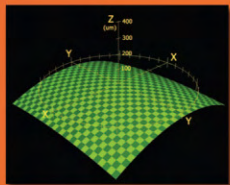


Ultra
Thinning



End-Pointing

Reliability



3D Curvature
Correction



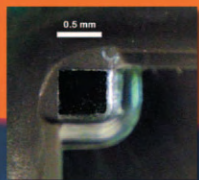
Backside
Preparation



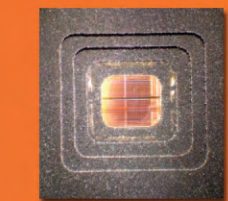
SEM

SIL

Laser Scan



Pre-FIB



Decapsulation

3D IC's

TSV

Yield Enhancement

Reverse Engineering

CSP

CONSUMABLES



In Stock
For You

Decapsulation

ULTRA TEC
MANUFACTURING, INC.

QA

Metallography

www.ultratecusa.com

ASAP-1® IPS

ASAP-1® IPS is a digital sample preparation system for the decapsulation, thinning and polishing of packaged wafer-level devices.

Drawing on ULTRA TEC's market knowledge and long-standing leadership in electronic sample preparation, IPS is 'device centric' – designed to meet the non-destructive, high yield and survivability needs of micro-electronic components.

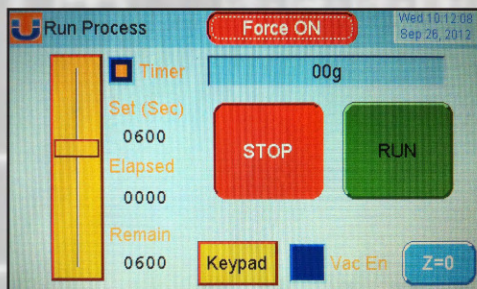
IPS' Touch Screen OS has been designed from the ground-up to control all aspects of the sample preparation process. Advanced programming drives IPS's deep sub-micron axes of motion. The OS contains conveniently laid out Screens for the various key set-up functions—including timer, tool type, polishing pattern, navigation, speed, pressure monitoring and more. Programs can be saved to flash drive.

The machine vision monitor provides an unique 'always-live' image of the device, along with key navigational and process information.

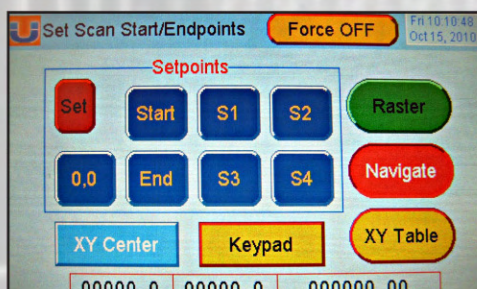
The touch-off tool control provides Z-position at pre-defined locations and pressures – enabling package and die tilt to be corrected quickly and accurately. Tool height variations are automatically-calibrated.



Best of Both Worlds – IPS' Dual Input Technologies allows for both touch screen and physical joystick and rotary encoders



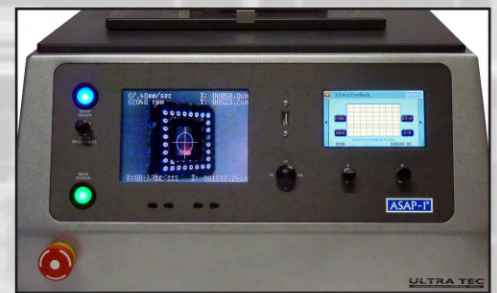
The Run Process Screen includes timers, pressure and Run Controls



X & Y Locations are defined to set the selected area dimensions for a specific tool diameter. A range of polishing raster patterns are available for various applications

Product Highlights...

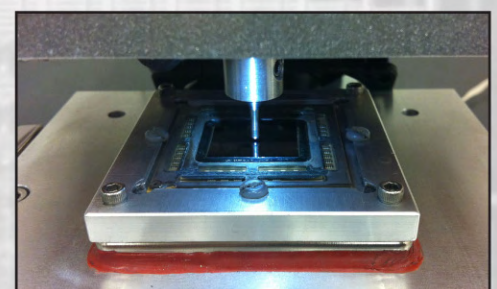
- Suits all sizes of die - package, wafer and board-level
- Real Time Video Monitor with system parameters
- Touchscreen control with physical joystick & encoders
- Full 100 x 100 mm Stage area
- X, Y and Z axes all have deep sub-micron accuracy
- Accurately decaps, thins substrate and polishes
- Floating Head (patented) provides a true polishing action
- Optional Force-Feedback enhances delicacy
- USB Flash Drive interface for saving recipes
- Short set-up and process times
- Accurate die-tilt adjustment 'on the fly'
- Bench-top & Quiet in Operation
- Special Purpose Modules further enhance IPS' Application range
- ULTRACOLLIMATOR Mode for topside delayering of bare die



All system controls are available from the front panel



Machine Vision – The on-board monitor is always live, uniquely showing the tool/surface interface overlaid with machine settings. Output to a PC allows video to be saved

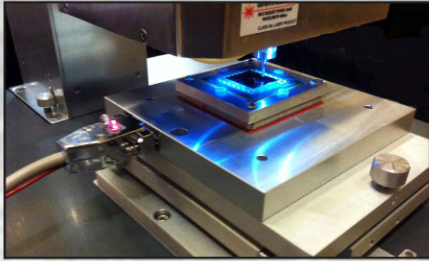


Touch-Off Tool – IPS uses 'touch off' techniques to program surface position and profile. Recalibration between tool changes is automatic

Unique Modular Upgrades

3D Thermal Relaxation

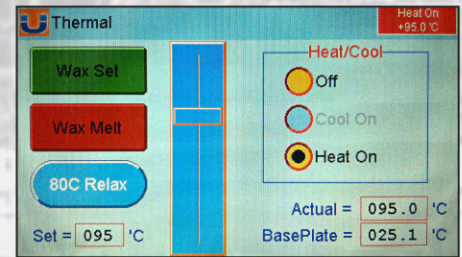
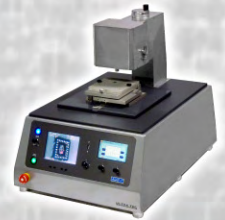
An ounce of prevention is worth a pound of cure



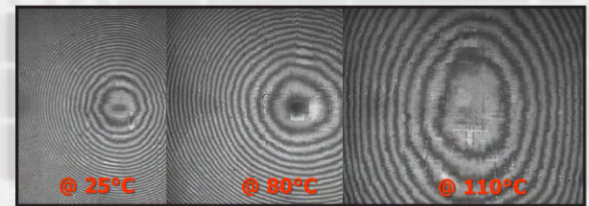
The Thermal Relaxation Module (patent pending) enhances ASAP-1 IPS' toolkit for improving the planarity of warped and curved packaged dice.

Controlled heating emulates the thermal profile of a device in service and 'relaxes' the substrate, removing die warpage and curvature. Sample preparation is then carried out 'at temperature.'

Thermal Relaxation is key to the successful, high-yield, crack-free preparation of many package types exhibiting die warpage. In situations of severe die stress, or where the substrate moves substantially during the removal process, further improvements may be seen by utilizing 3D curvature control simultaneously with Thermal. ULTRA TEC's Thermal Stage also acts as a useful 'in situ' hot plate for the rapid melting and setting of hot melt waxes such as Crystal Wax.



The Thermal Screen allows the user to accurately control the temperature of the (optional) thermal stage to model the thermal profile of the DUT in service.

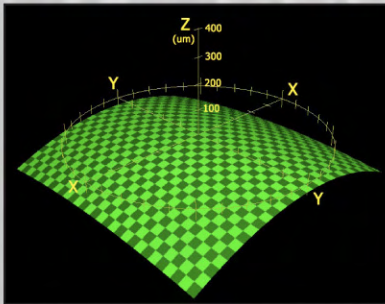


Results of Thermal Relaxation. Moiré Fringes, resulting from thinning and polishing similar packages at increasing temperature.

Note: Fewer Fringes = higher planarity

3D Curvature Correction

Defining Curvature further improves planarity

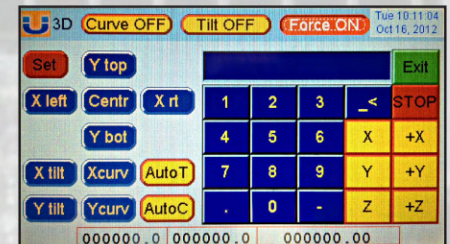


3D Curvature Correction, when used alone, or in conjunction with Thermal Relaxation provides a flatter, more planar, backside-thinned and polished die—optimized for SIL, laser scan and other microcopy techniques.

ASAP-1 IPS offers several unique features, including the ability to set X and Y Axis Curvature Independently. This suits rectangular dice or where curvature and stress varies between axes.

An unique AUTOCURVE feature sets curve parameters automatically for an 'unknown' part. After Moiré analysis, or laser interferometric measurement of the resulting substrate, small modifications may be made to the refine the final process.

Further Reading: 'Stress Reduction During Silicon Thinning Using Thermal Relaxation Techniques'; H Patel, J Colvin and T Hazeldine; ISTFA 2012



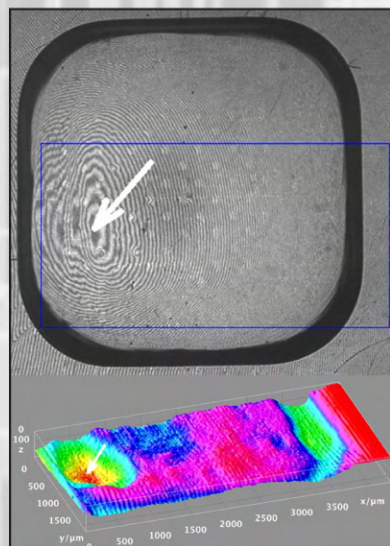
The 3D Screen offers a range of set-points and modes to allow surfaces to be profiled and corrected by IPS. AutoTilt and AutoCurve modes automatically adapt the system for a DUT's surface profile.

End-Point Detection

In-system materials characterization

The High Impedance / Small Capacitance End-Point Detection Module (patent pending) allows the ASAP-1 IPS to quantify and act upon the capacitive and/or resistive differences in properties between electronic devices and packaging materials. End-pointing can enhance decapsulation and sample preparation process results, by removing the guesswork.

Further Reading: 'FemtoFarad/TeraOhm Endpoint Detection for Microsurgery of Integrated Circuit Devices'; J Colvin, ISTFA 2012

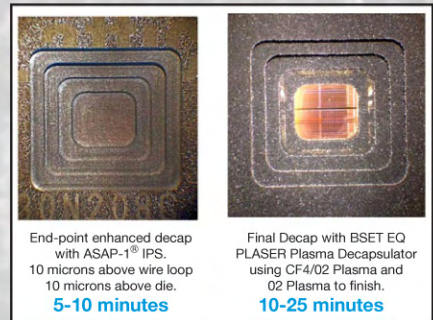


4 x 4mm pocket area backside thinned into an IC on a deliberate tilt confirms end-point. The indicated spot shows the thinnest remaining silicon (2.5microns) on the left. The Upper image shows the fringes at 1064nm and the Lower image is a C-SPM image of the area of interest, produced on the ASAP-1® IPS system.



Graphics card mounted and electrically connected to the end-point sensor plate.

Enhanced Tunnel Decapsulation



End-point enhanced decap with ASAP-1® IPS.
10 microns above wire loop
10 microns above die.
5-10 minutes

Final Decap with BSET EQ PLASER Plasma Decapsulator using CF4/O2 Plasma and O2 Plasma to finish.
10-25 minutes

ASAP-1[®] IPS

Digital Preparation System



System Specifications

Z-Vertical Direction Precision	0.04 microns (40 nanometers)
Table Precision (X & Y Travel)	0.2 microns (200 nanometers)
Table Travel Amplitude	100mm x 100mm
Polishing Method	Patented ASAP-1 [®] Float-down head, with Z-lock, enhanced with electronic sensors and tool patterns
Video	Real-time machine vision with 6.5 inch video monitor. External Video Output (NTSC)
Programming Input Method	Touchscreen with joystick and 3 physical rotary encoders
Machine Vision	Real-time Video of overlaid with stage and process variables.
Tilt Control	Computer-aided 2-circle tilt control, ULTRACOLLIMATOR Measurement (option)
Force Control	100grams (max) with 1 gram precision. Overall accuracy +/- 10 grams
Recipe Load & Save	USB Port, for removable flash drive (up to 2Gb)
Z Position Touch-off Method	Mechanical Positioning with Force-feedback (option) sensors.
X & Y Position	LASER Targeting
Power Consumption	300 Watts Maximum in use
Power Requirements	Universal: 100-120VAC; 200-240VAC
Footprint	19 inches (480mm) Width x 25 inches (635 mm) Depth x 22 Inches (560mm) Height

Ordering Information

Order Code	Item	Description
6760.2	ASAP-1 [®] IPS	DIGITAL Selected Area Preparation System, 100-240V, 50/60Hz. Includes: X-Y table with 100x100mm area, tool spindle with deep sub-micron micron Z-resolution, tilt-table, touch-screen with custom OS, real-time machine vision, 6.5 inch lcd monitor, Video Out. Set-up toolkit, incl. 2mm & 3mm tools
6760.1	ASAP-1 [®] IPS with ULTRACOLLIMATOR	As above with addition of ULTRACOLLIMATOR (patented) optical alignment

Standard System Upgrades

6389.1	Force Feedback Module	Adds force feedback control software for delicate samples and dice (1g readout resolution, force feedback programmable in 1g increments, force hysteresis programmable in 1 gram increments for noise control)
6715.1	High Torque Motor	3X Torque motor upgrade. Suits aggressive material requirements such as removal of thick heat-sinks, metals & ceramics
6780.1	Vacuum Pump	Removes particulates during decapsulation and thinning. Includes main pump unit and collection tube hardware. Modular -- 110V (6780.2 -- 220-240V version)

3D Upgrade Modules

6394.1	Curvature Correction	Adds sample curvature definition -- Suits decapsulation, thinning, and polishing of packaged dice showing warpage or non-flat conditions. Independent X & Y Axis Correction, AUTOCURVE Mode. Also adds Stage AUTOTILT function
6366.1	Thermal Relaxation Stage	Adds thermal relaxation capability for warped die. Peltier-based heating plate with 1C accuracy. Hot Plate mode for convenient sample mount/demount. Includes stage, cable, two custom mounting plates with nylon retention screws

Characterization Modules

6368.1	End-Point Detection Module	High impedance / small capacitance based -- Hardware and Software Upgrade to add end-pointing for enhancement of decap, deprocessing, and polishing
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