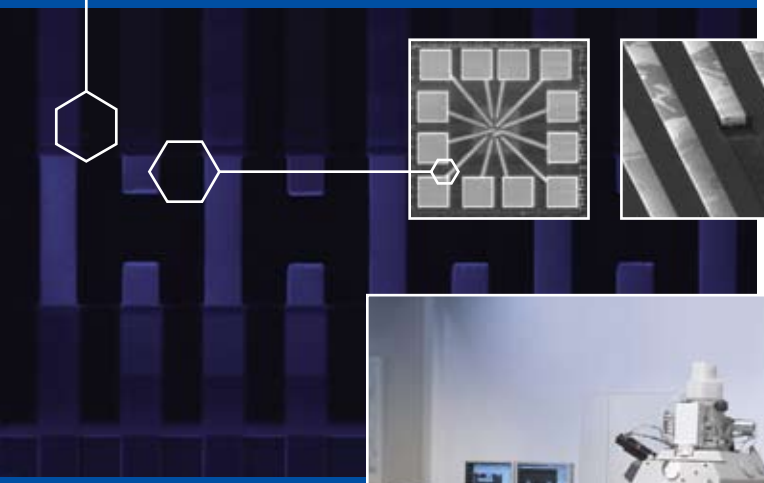
PRODUCT DATA

FEI COMPANY™



Versatility and volume

V600FIB System

The Most Efficient, Flexible and Cost-effective Device Modification Tool Available for Today's Semiconductor Lab

Extensible for advanced Circuit Edit needs at smaller technology nodes, the V600FIB effectively delivers circuit modification, cross-sectioning and failure analysis capabilities to greatly shorten the product introduction cycle for today's integrated circuits (ICs).

The ultimate solution for high-throughput device modification and analysis

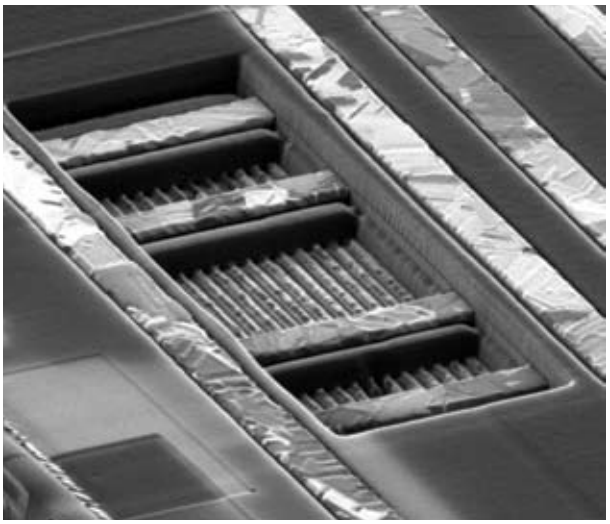
The V600FIB system provides a complete solution for general-purpose edit and debug. Based on the field-proven success of FEI's FIB 200, the V600FIB offers the next generation of flexibility and performance required for effective cross-sectioning, imaging and transmission electron microscopy (TEM) sample preparation.

High-resolution milling and imaging

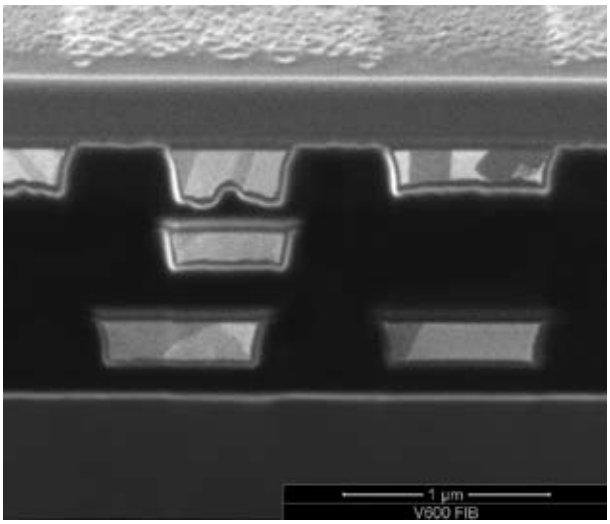
FEI's most advanced 30 kV, 5 nm Sidewinder ion column bolsters the V600FIB's abilities for high-resolution imaging and milling. With its vertically positioned, optimized working distance and improved beam profile and quality, the Sidewinder delivers not only precise, high-resolution milling but also quick access to subsurface features on a broad range of materials. Mid-column steering for low-voltage operation minimizes damage in TEM-sample lamellas. High-current operation ensures rapid material removal and increased sample throughput.

Target Applications for V600FIB:

- *High-throughput design modifications, such as transistor-level modifications and interconnect-level metal rerouting*
- *Probe point creation*
- *In-situ cross-sectioning and analysis of IC devices*
- *TEM sample preparation*
- *Micro machining*
- *Advanced Circuit Edit and prototyping*



Access copper and aluminum interconnects easily and quickly



Rapid cross-sectional analysis of advanced semiconductor process technologies

Speed, precision and control

The V600FIB features a GIS-based gas delivery system that accommodates up to five gas options. Precursor material is contained entirely within the vacuum system for simple, flexible, yet safe operation. The array of gas chemistries and delivery options provides speed, precision and control for various endeavors, including selective etch of dielectrics. It also provides multiple metal depositions, multiple metal etchants and improved IDEP insulator performance.

Enhanced navigation

By incorporating a five-axis piezo stage, the V600FIB offers uncompromised tilt and cross-sectioning capabilities on a wide range of samples, from packaged parts to full 200 mm wafers. An industry-recognized Windows® based operating system accommodates field-proven, xT-application specific software and seamless integration with Knights™ Camelot CAD software for sample navigation.

Design changes to the interconnect level are rapidly implemented by cutting and rerouting tracks. The high-throughput, versatile system offers optimization of new circuits without both the high costs and cycle-time delays associated with mask fabrication and integrated-circuit processing. Now you have the power to perform circuit modifications in a matter of hours, instead of days or weeks. The V600FIB is the key to dramatically accelerated learning curves and yield ramps in your lab.

The V600FIB core instrument is comprised of the following:

- *Sidewinder 30 kV ion column – high current, excellent beam profile and stability*
- *Imaging resolution (5 nm @ ~16.5 mm working distance and 30 kV accelerating voltage)*
- *Fully digital control*
- *Integrated real time monitor (iRTM) for on-screen milling display*
- *150 mm x 150 mm eucentric stage*
- *Manual user interface on Windows workstation*
- *Joystick control*
- *CCD infrared (IR) in-chamber camera*
- *CDEM detector*
- *Oil-free pumping system*
- *Table top with support*
- *S2 compliance kit*

V600FIB essential specifications

System Options:
- *Up to five gas options for metal deposition, enhanced etch, insulator deposition, insulator enhanced etch and organics*
- *Charge neutralizer (electron flood gun)*
- *AutoFIB™ software (multi-site, multi-task automation software)*
- *AutoTEM™ wizard software (automated TEM sample preparation process)*
- *CoppeRx™ (bulk copper removal process)*
- *Knights Camelot CAD software license and interface*
- *High resolution printer*
- *Various sample holders*

Ion Optics:
- *Sidewinder FIB column – gallium liquid metal ion source (LMIS)*
- *Source lifetime: ~1000 hours*
- *Resolution: 5 nm*
- *Maximum horizontal field width: 2.5 mm at 5 kV (corresponds to 50x minimum magnification in quad view mode)*
- *Accelerating voltage: 2 – 30 kV*
- *Probe current: 1.5 pA – 20 nA in 15 steps*
- *Beam blanker standard – external control possible*
- *15 position aperture strip*

Detector:
- *Continuous dynode electron multiplier (CDEM)*

Digital Image Processor:
- *Dwell: 50 ns – 1 ms*
- *11 presets + photo + snapshot*
- *Up to 3584 x 3094 pixel resolution*
- *File type: TIFF (8 or 16 bit), BMP or JPEG*
- *Single frame or four-quadrant image display*
- *Four quadrants live*
- *256 frame averaged or integration*

FIB Digital Pattern Generator:
- *4k x 4k resolution*
- *1 M pixels addressable*
- *Minimum dwell: 100 ns*
- *Maximum dwell: 4 ms*

GIS Gas Chemistry and Delivery System:
- *Up to five beam chemistries for enhanced etch or deposition*
  - *Tungsten, platinum, and carbon deposition*
  - *Insulator deposition (SiO_2) with TEOS*
  - *Enhanced insulator and low-K dielectric etch (XeF_2)*
  - *Enhanced metal and silicon etch (Iodine)*
  - *Enhanced etch for copper cutting and organics (H_2O)*
- *SEMI S2 compliance*
- *Conductor resistivity < 200 μΩ·cm*
- *Insulator resistivity > 1 E+15 μΩ·cm*

End-point Detection:
- *By stage current graph (UI element)*
- *By real-time secondary electron imaging*

Charge Neutralization:
- *By newly developed charge neutralizer for high-current milling*

Software:
- *iRTM (integrated real time monitor) for on-screen milling display*
- *"Beam per Quad" graphical user interface*
- *Patterns supported: lines, boxes, open boxes, polygons, circles, cross-section and cleaning cross-section*
- *Patterns based on current and imported image*
- *Directly imported BMP file for 3D milling*
- *AutoFIB automation for multi-site sample milling requirements (optional)*
- *AutoTEM automation for TEM sample preparation (optional)*
- *Knights Camelot CAD software plus maintenance (optional)*

System Utilities

Vacuum System:

- *1x 240 l/s TMP oil-free*
- *1x PVP oil-free*
- *1x IGP (total for ion column)*
- *Chamber vacuum: < 2.6e-06 mbar*
- *Evacuation time (high vacuum): < 5.0 mins*

Chamber:

- *379 mm left to right*
- *21 ports*
- *16.5 mm working distance*

Five-axis Motorized Stage:

- *Eucentric goniometer stage*
- *X = 150 mm*
- *Y = 150 mm*
- *Z = 10 mm*
- *Clearance = max. 55 mm to eucentric point*
- *T = -10° to +60°*
- *R = n x 360°*
- *Minimum step: 100 nm*

System Control:

- *32-bit graphical user interface with Windows 2000, keyboard, optical mouse, multifunctional control panel and joystick (optional)*
- *Image display: 2 x 19-inch LCD, SVGA 1280 x 1024*

Standard Utilities:

- *Support computer*

System Options:

- *Omniprobe (for TEM prep)*
- *125, 150 and 200 mm wafer holders*

Consumables:

- *Replacement Ga-ion source*
- *Aperture strips for ion column*
- *CDEM detector*
- *Gas chemistry crucibles*

Installation Requirements:

- *Power voltage 230 V (-6%, +10%)*
- *Frequency 50 or 60 Hz (+/- 1%)*
- *Power consumption: < 3.0 kVA for basic microscope*
- *Environment temperature 20°C ± 3°C, relative humidity < 80% RH*
- *Stray magnetic fields*
  < 100 nT a synchronous
  < 300 nT synchronous
- *Door width: 120 cm*
- *Weight: column console 700 kg*
- *Compressed air 4-6 bar – clean, dry and oil-free*
- *System chiller*
- *Acoustics: < 60 dB*

Compliance:

- *SEMI S2- 03*
- *CE Certified*

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03DS-FI0111 06/06