

## V600CE Focused Ion Beam High-Performance Circuit Edit and Design Debug Solution

The V600CE™ focused ion beam (FIB) system incorporates the latest developments in ion column design, gas delivery and end point detection to provide fast, efficient, cost-effective editing on advanced integrated circuits at the 65 nm technology node and beyond. Circuit editing allows product designers to reroute conductive pathways and test the modified circuits in hours, rather than the weeks or months that would be required to generate new masks and process new wafers. Fewer, shorter modification and test cycles allow manufacturers to ramp new processes to profitable high volume yields faster, and be first to market with premium priced new products. The V600CE is specifically designed to meet the challenges of advanced designs and processes: smaller geometries, higher circuit densities, exotic materials and complex interconnect structures. The V600CE can be configured for backside editing with an optional IR microscope and bulk silicon trenching package.

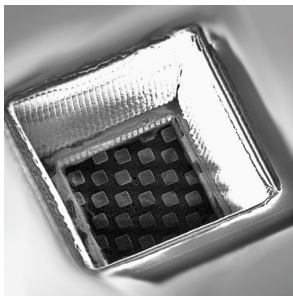
### NanoChemix Gas Delivery

FIB circuit editing tools use controlled amounts of specific gases, injected near the beam at the sample surface, to enhance the speed and selectivity of the milling process, and to deposit conductive and insulating materials in precisely controlled patterns. The V600CE's innovative NanoChemix™ gas delivery system increases editing flexibility with variable pressure control and a wide variety of solid, liquid or gas precursor materials. Its unique tri-nozzle design ensures a symmetric, high-flux flow of agents. A dedicated central nozzle delivers precursor for metal depositions. Dual opposing nozzles deliver etch gases and eliminate the shadowing that occurs in trenches milled using single-nozzle systems. Gas mixtures are used to improve electrical performance of insulator depositions. Automated purge routines and controlled gas volumes provide fast, easy switching between gases and shorten pump down times. Integrated toxic gas monitors and complete compliance with SEMI S2 standards ensure operator safety.



*Right, First, Fast*

- *Fast, precise circuit modifications allow design changes in hours without processing new silicon*
- *NanoChemix gas delivery system provides improved speed, flexibility, uniformity, and quality in material removal and deposition*
- *Sidewinder ion column delivers more current to a smaller spot for faster, more precise milling*
- *Simultaneous plots of SE and specimen current improve end point detection*
- *Fast, accurate cross sectioning reveals defects and subsurface features*
- *Automated TEM sample preparation with low voltage final polish*
- *Electrical feedthroughs for probing applications*
- *Optional backside editing capability with near infrared microscope and Si trenching package*



The V600CE improves etching planarity with its NanoChemix gas delivery system.

### Sidewinder Ion Column

FEI's Sidewinder™ ion column delivers unrivalled capability and flexibility with seamless operation from 30 kV to 500 V. High current density milling at 30 kV ensures rapid material removal and increased throughput, while low kV operation is useful for selective etching of copper and removing amorphous damage on TEM lamellae.

### Backside Edit Option

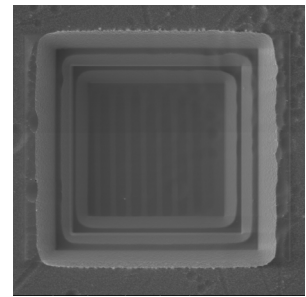
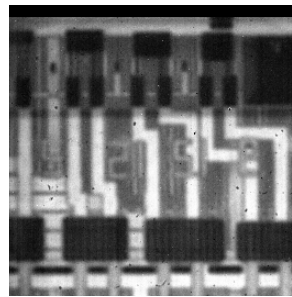
A near infrared microscope permits imaging of target structures through front side dielectric and backside bulk silicon for fast, accurate navigation. The bulk silicon trenching package includes a special coaxial gas delivery nozzle that accelerates bulk silicon etching for faster access to circuitry from the backside.

### Specifications

Ion Column	Sidewinder, Ga liquid metal 1000 hour lifetime
Acc. Voltage	500 V - 30 kV
Beam Current	1.5 pA - 21 nA
Image Resolution	5 nm
Stage	5-axis motorized eucentric X, Y motion 150 mm Tilt -10° to 60° Rotation 360°
End Point Detect	Simultaneous SE/specimen current auto scaled plots
Operating System	Windows® based

### Key Options

Hardware	Charge Neutralizer (electron flood gun) Bulk Si Trenching and IR Microscope Package
Software	AutoFIB (with drift compensation), AutoTEM, CAD Navigation CopperX™ (bulk copper removal)



IR imaging (left) allows navigation to targeted features hidden beneath front side dielectric or backside bulk silicon. Gas assisted etching provides rapid removal of bulk silicon (right).

### End Point Detection

The V600CE's simultaneous, auto scaled plots of secondary electron and specimen current signals ensure reliable, accurate end point detection when the milling procedure reaches the target structure.

### Enhanced Navigation and Automation

A five axis, piezo driven stage and seamless integration with CAD software provide fast, accurate navigation. The stage accommodates a wide range of samples from packaged parts to 200 mm wafers. Electrical feedthroughs enable *in situ* probing. Optional automation software includes AutoFIB™ for multi site cross sectioning and AutoTEM™ for S/TEM samples.

### NanoChemix Gas Delivery System

XeF <sub>2</sub>	Insulator and low k etch
H <sub>2</sub> O	Organics and copper etch
Cl <sub>2</sub>	Aluminum and silicon etch
TMCTS	Insulator deposition
W(CO) <sub>6</sub>	Tungsten deposition

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