UltraHigh-Resolution Scanning
Electron Microscope
SU9600

HITACHI

SU9600

Ultrahigh-Resolution
Scanning Electron Microscope

Specifications

Items		Description
SE image resolution		Secondary Electron Image Resolution: 0.4 nm @ 30 kV
		1.0 nm @ 1 kV
		0.6 nm @ Landing Voltage of 1 kV*1
STEM image resolution*3		0.34 nm @ 30 kV (lattice image)
Accelerating voltage		0.5 to 30 kV
Landing voltage*1		0.01 to 20 kV
Electrical image shift		Up to ±5 μm (Specimen height = 0.0 mm)
Stage traverse		X: ±4.0 mm, Y: ±2.0 mm, Z: ±0.3 mm, T: ±40°
Specimen size	Flat specimen stage	5.0 mm × 9.5 mm × 3.5 mm (H) (Max.)
	Cross section specimen stage	2.0 mm × 6.5 mm × 5.0 mm (H) (Max.)

System Function

Items		Description
Magnification	LM Mode*2	80 to 10,000x
	HM mode*2	800 to 3,000,000x
Image Display Mode	Large Screen	1,280 × 960 pixels
	Single Screen	800 × 600 pixels
	Dual Screen	800 × 600 pixels
	Quad Screen	640 × 480 pixels
	6-Image	640 × 480 pixels (requires 2 monitors)
	2-Image	1280 × 960 pixels (requires 2 monitors)
	Pixel Size	640 × 480, 1,280 × 960, 2,560 × 1,920, 5,120 × 3,840, 10,240 × 7,680, 20,480 × 15,360*3, 40,960 × 30,720*3 pixels
Scanning	Modes	Rapid scan: 2 modes (Rapid 1/Rapid 2)
		Fast scan: 2 modes (Fast 1/Fast 2)
		Slow scan: 7 modes (Slow 1 to Slow 7)
		Charge Supression Scan (CSS): 7 modes (CSS 1 to CSS 7)
		Customer scan, pixel dwell time: 100 ns-2 ms (50 Hz), 80 ns-1.6 ms (60 Hz)
		Reduced scan: 3 modes (High, Medium, Slow)
		Wide scan: 2 modes (High, Slow)
		Beam marking mode

System Configuration

Items		Description
Electron optics	Electron gun	Cold cathode field emission source
	Lens system	3-stage electromagnetic lens
	Beam blanking	Electrostatic type (synchronized with scanning signal)
	Objective lens aperture	Movable aperture (4 openings selectable from outside of vacuum, with fine adjustment)
Stage	Stage	Side entry goniometer stage
	Specimen holder	Standard holder (1 included)
	Specimen stage	6 types (1 included)
Detector	Detector	Secondary electron detector (with SE/BSE signal mixing capabilities)
		Top detector*3
		VCD (Variable Crystal Detector)*3
		BF/DF Duo-STEM detector*3
		Energy dispersive X-ray detector*3

Installation condition

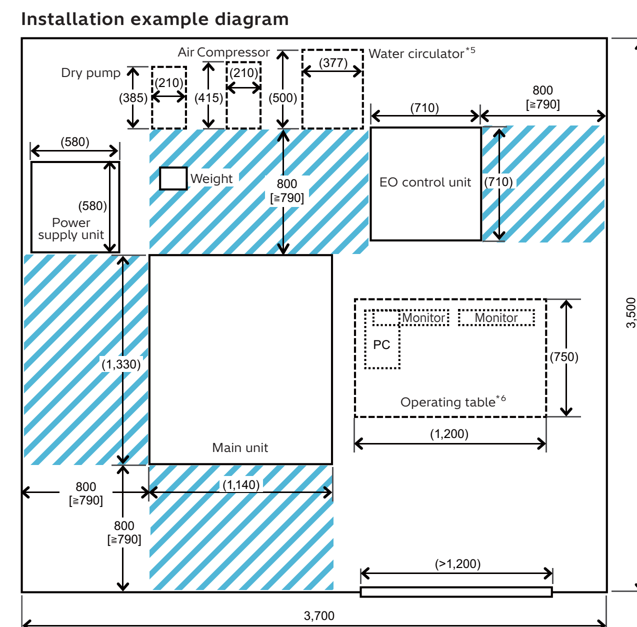
Items	Description
Room Temperature	15 to 25 °C
Humidity	60% RH or less (non-condensing)
Power (main unit)	4 kVA AC100 V±10 % 50/60 Hz or AC200-240 V±10% with autotransformer
Grounding	D-type grounding
Cooling water (Chiller)	Dedicated Cooling Water Circulation system*3
Vacuum pump	Dry pump*3
Air Compressor*4	0.6 to 0.8 MPa

Dimensions and Weight

Items	Width(mm)	Depth(mm)	Height(mm)	Weight
Main unit	1,140	1,330	1,860	Approx. 813 kg
EO control unit	710	710	1,210	Approx. 269 kg
Power supply unit	580	580	970	Approx. 91 kg
Power supply unit (S2/CE)	580	580	970	Approx. 153kg
Weight	200	160	140	Approx. 25 kg
Recommended dry pump	210	385	300	22 kg
Recommended air compressor	210	415	514	17 kg

Note: Product tolerances are ±10% of table values.

Installation example diagram



*1: With optional deceleration holder and top detector.
*2: Magnification is specified with 127 mm × 95.25 mm as the display size.
*3: Option
*4: In case of connection from installation site facilities.
*5: Dimensional reference values for CT-6020 installation
*6: Recommended size

Notice: For correct operation, follow the instruction manual when using the instrument.

Specifications in this catalog are subject to change with or without notice, as Hitachi High-Tech Corporation continues to develop the latest technologies and products for our customers.

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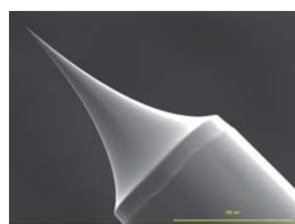
The world's highest resolution SEM — now with higher throughput and improved automation with efficient workflows.

Nanometer-scale morphology observation is critical due to the trend of decreasing feature sizes in semiconductor devices and the development of advanced materials. With respect to this, Hitachi High-Tech has developed the SU9600 Scanning Electron Microscope (SEM) that enables subnanometer observations. The new SU9600 system retains the world's highest resolution*1 of 0.4 nm at 30 kV. It also boasts high throughput and stability making it a powerful tool for research and characterization of next-generation materials.

Core Technology : Cold field-emission electron source

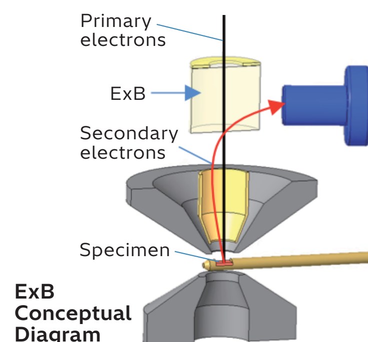
Cold field-emission (FE) electron sources offer unparalleled capabilities for high-resolution observation. Hitachi High-Tech introduced the first commercial cold FE electron source in 1972 and has worked continuously to improve the technology ever since. The SU9600 is equipped with our latest electron gun that provides stable beam irradiation and high brightness. In addition to enabling image acquisition with a high signal-to-noise ratio even at low accelerating voltages, the SU9600 allows stable observations that require high probe-current irradiation over a long period of time.



Cold field emitter tip

Core Technology : ExB

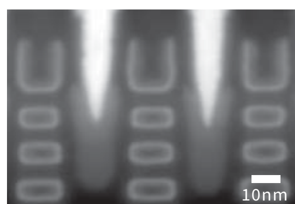
Efficient detection of secondary electrons (SE), without changing the trajectory of the primary electrons, is possible by forming a mutually orthogonal electric and magnetic field (ExB field) above the objective lens. This core technology makes it possible to obtain images with excellent S/N and contrast, even at low probe-current settings which are often required for high-resolution imaging.



ExB Conceptual Diagram

Core Technology : Low-aberration in-lens objective lens

In-lens objective lens has the advantage of reducting spherical and chromatic aberration effectively by shortening the focal length. Compared to conventional lens designs, Hitachi's in-lens objective lens enables acquisition of higher-resolution images. It also provides stable observation of micro structures on the scale of a few nanometers or below.



Specimen: SRAM
(GAA structure cross section)
Accelerating voltage: 7 kV
Magnification: 1,000 kx

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*1: As of October 2025 *2: Option

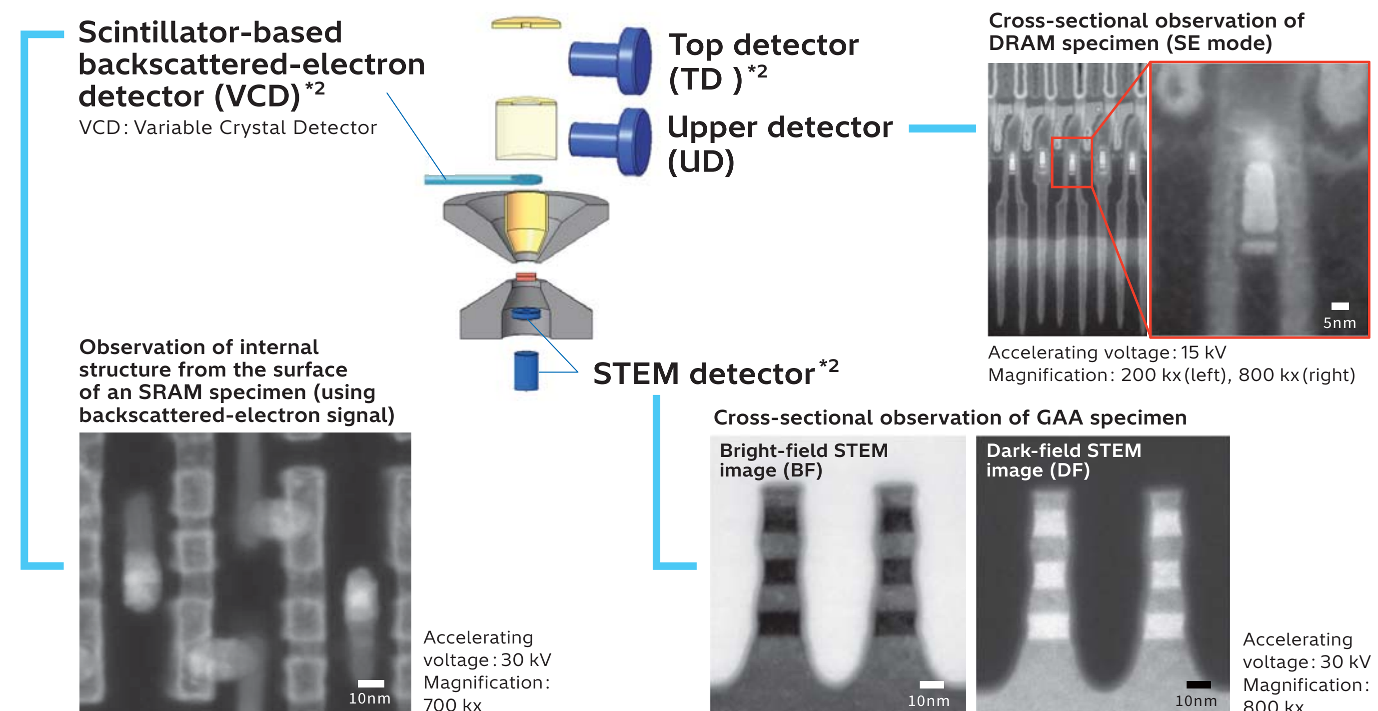
The SU9600 : Hitachi's new Flagship Cold Field SEM

Key features of the SU9600:

- Ultra-high-resolution observations enabled by Hitachi's proprietary technology
- Next-generation imaging capabilities enable highly efficient observation workflows without sacrificing resolution
- A host of new functionality to support automation and streamlined instrument operation

Complete Lineup of Detectors

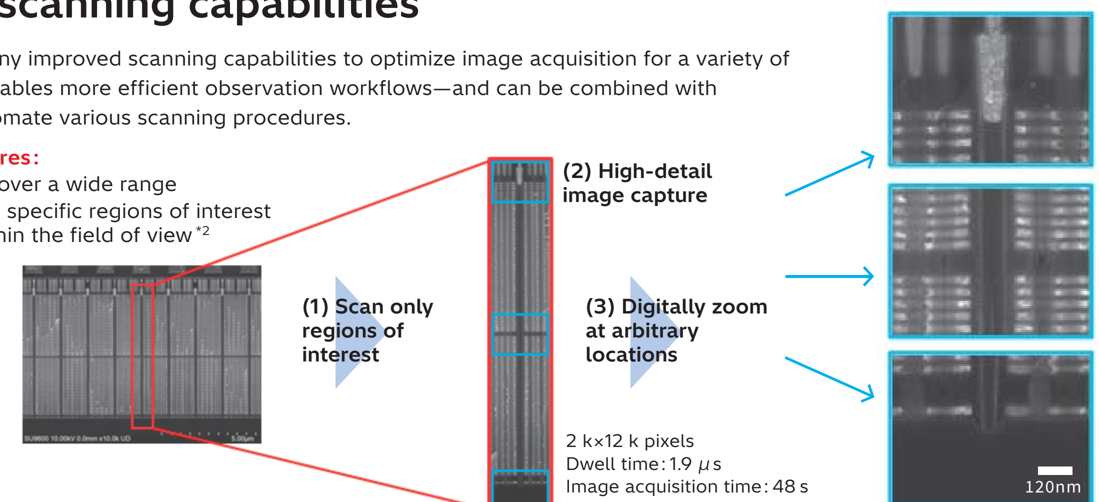
The SU9600 incorporates multiple detectors to allow acquisition of secondary-electron, backscattered-electron, and transmission-electron signals. New secondary-electron signal-control capabilities enable a wide variety of observation modes that can be optimized for any type of specimen. The newly-developed variable crystal detector (VCD), a scintillator-based backscattered-electron detector, improves response times, making it easier to pinpoint specific observation regions.



Enhanced scanning capabilities

The SU9600 provides many improved scanning capabilities to optimize image acquisition for a variety of specific purposes. This enables more efficient observation workflows—and can be combined with EM Flow Creator*2 to automate various scanning procedures.

Enhanced scanning features:
- Dwell time configurable over a wide range
- Support for imaging only specific regions of interest at arbitrary locations within the field of view*2
- Capture highly detailed images up to 40,960× 30,720 pixels*2



Observation of cross-sectional morphology in a NAND flash-memory specimen (SE mode)