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DATASHEET

Talos F200E S/TEM

High-throughput, multi-purpose TEM with low-distortion imaging for a wide range of applications

The Thermo Scientific Talos F200E S/TEM (scanning/transmission electron microscope) delivers the fast, precise, quantitative characterization of semiconductor and display devices in multiple dimensions. With innovative features designed to optimize productivity, precision and ease of use, the Talos F200E S/TEM is ideal for semiconductor labs in an industrial environment.

Main characteristics

The Thermo Scientific™ Talos™ F200E S/TEM combines outstanding high-resolution STEM and TEM imaging with industry-leading energy dispersive X-ray spectroscopy (EDS) signal detection and 3D characterization with compositional mapping.

Utilizing the Thermo Scientific Velox™ Software the Talos F200E supports many ground-breaking, unique features for semiconductor applications, including: live TEM image rotation, simultaneous operation of multiple STEM detectors, integrated differential phase contrast (iDPC) imaging, STEM field-of-view matching, drift corrected frame integration (DCFI) in both TEM and STEM, instant EDS map quantification, integrated spectrum profile for accurate EDS quantification and time resolved EDS mapping.

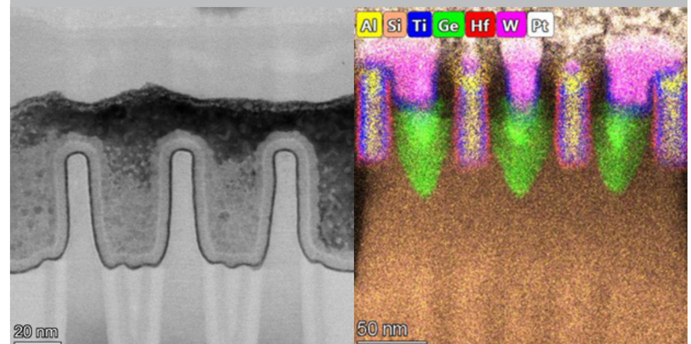
The Thermo Scientific Ceta-M™ 16M Camera displays a large field of view and supports free image rotation. The stage control is synchronized with the image rotation. (S)TEM DCFI, together with the piezo stage, ensures maximum imaging quality, saving time and allowing you to capture more data from each sample.

Accelerate analysis for high productivity

The Talos F200E S/TEM can be configured with either the Thermo Scientific Super-X™ or Dual-X™ integrated EDS system. Both have multiple silicon drift detectors (SDDs) for superior sensitivity and are proven in the semiconductor industry. Integration with the X-TWIN objective lens maximizes collection efficiency while delivering outstanding EDS output count rates.

The electron optical system of Talos F200E S/TEM is further optimized to reduce image distortion. Together with the low-distortion Ceta-M camera, it guarantees industry leading measurement reliability and higher productivity.

Key Benefits
High-resolution, high-throughput, and high-quality TEM/STEM imaging and simultaneous, multiple signal detection and contrast-optimized STEM imaging
Rapid, precise qualitative or quantitative EDS acquisition and analysis.
Dedicated semiconductor-related applications, such as STEM field-of-view matching, live TEM image rotation, and minimized image distortion.



A bright-field STEM image and an EDS map of FinFET.

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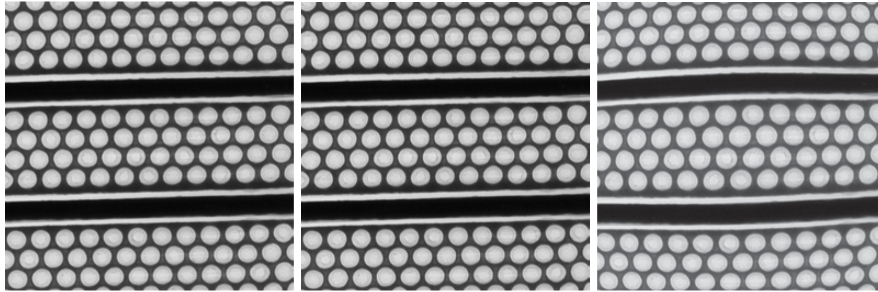
Image distortion and variation

The three examples below show the simulated effects of distortion on a 3D NAND image. The original image is shown on the left. The middle image shows the effects of linear image distortion, which is the result of magnification differences in the X and Y direction. This makes the 3D NAND cell images appear elliptical. The image on the right highlights the effects of magnification variability within the field-of-view. This makes the 3D NAND cells located at the corners of the image appear smaller than those at the image center.



TEM image distortions are generated by optical system variability and from intrinsic camera distortions. The Talos F200E features an optimized optical system and a dedicated low-distortion camera which guarantees minimal image distortion, greatly improving TEM data reliability and integrity.

Installations Requirements

Refer to pre-install guide for detailed data.

Additional features

- High-brightness field-emission gun: X-FEG brightness is >4x brighter than a conventional Schottky FEG
- Class-leading optical performance—Constant-power X-TWIN objective lens, high resolution, and large EDS collection angle.
- Maximized productivity—Fast, easy operation and mode switching.
- Ultra-stable platform—Constant power objective lens, piezo stage, robust system enclosure, and operation in a different room ensure maximum stability and minimal lab environment requirements.
- SmartCam camera—Digital search-and-view camera improves the handling of all applications and allows daylight operation.
- Low-distortion imaging—Guaranteed minimized linear image distortion and optional minimized TEM image variation ensures measurement reliability.
- Live TEM image rotation—Aligning device features by live image rotation, with synchronized stage movement control.
- Remote monitoring—Monitoring performance or performing basic operations remotely through intranet or internet.
- Greatly improved sensitivity—Proprietary Panther STEM sub-system delivers images with excellent signal-to-noise ratio even the probe current is very low.
- 3D volume analysis—Capable of 3D volume analysis with TEM, STEM, and EDS tomography.
- AutoSTEM—STEM imaging auto-focus and auto-stigmation.
- Align Genie—Automated alignment package for both daily and column alignment provides optimized and reproducible setup.

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Brightness of X-FEG	1.8×10^9 A/cm^2 srad (@200kV)	
Max. TEM beam current	> 50nA	
EDS system	Super-X	Dual-X
Full solid angle	0.9 srad	2.56 srad
Effective solid angle*	0.9 srad	1.65 srad
Detectors	4 SDD	2 larger SDD
Camera	Low-distortion Ceta 4k x 4k	
STEM	Panther STEM segment detectors	
SEMI S2	Certified	
STEM resolution	≤0.16 nm	
TEM information limit	≤0.12 nm	
TEM line resolution	≤0.10 nm	
Max. diffraction angle	24°	
Z-movement	±0.375 mm	
TEM image linear distortion	≤1%	
TEM image variation (option)	≤1%	
Gatan Continuum	Optional	

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