Cascade

CM300xi

300 mm Semi-/ Fully-automated Probe System

Overview

The CM300xi is a wafer probe station for wafer sizes up to 300 mm (12 inch). It meets the measurement challenges brought on by extremely complex requirements, such as unattended testing on small pads over time and at multiple temperatures.

The CM300xi provides lab automation capabilities and enables critical precision electrical measurements for device characterization, high-volume engineering and extremely challenging applications. It is also ideally suited in customized solutions, niche production applications, and emerging markets.

The CM300xi offers measurement accuracy and reliability in a solution that is completely modular – whether it is I-V/C-V, RTN and RF measurements in one semi-automated system, or a fully-automated dual-prober system that handles any combination of 200 mm and 300 mm wafers.

Contact Intelligence™ is a unique technology which guarantees to make and hold wafer contact with constant high quality. A powerful combination of innovative system design and smart software algorithms provides an automated solution to achieve highly-reliable measurement data. It reduces test cycle times and provides faster time to data, regardless of which application you are addressing.

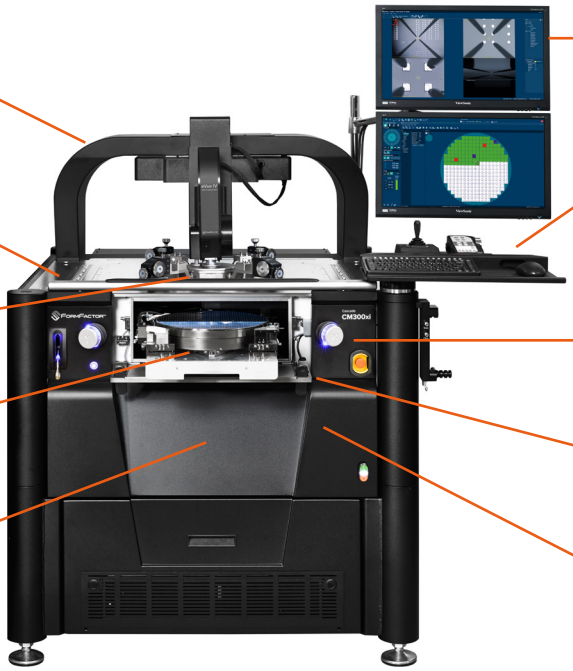
Contact Intelligence™

Features / Benefits

Higher efficiency and lower cost of test	• Scalable from semi-automated operation to fully-automated prober or dual-prober system
High accuracy and repeatability	• Superior low-leakage and low-noise measurements • Safe and accurate hands-off testing with reliable and repeatable contact
Automated test	• Contact Intelligence enables unattended tests on small pads • Thermally induced drift can be automatically corrected, enabing automated temperature transitions over the full temperature range using VueTrack or ReAlign (the effective temperature range and minimum obtainable pad size depend on probe card and probe card holder or positioner used)
Test productivity	• Fast delivery of a wide variety of precise model parameters to enhance process and device development
Flexibility	• DC, AC and RF/microwave device characterization, 1/f, WLR, FA and design debug • Full thermal range of -60°C to +300°C, supported by high thermal stability design • Usage of manual and motorized positioners, probe cards within EMI-shielded environment

Note: For physical dimensions and facility requirements, refer to the CM300xi Facility Planning Guide. If not otherwise mentioned, the specified values are given for a temperature range from +18°C to +24°C and relative humidity of 20% to 50%.

System Components



Programmable Chuck Stage

X-Y Stage	
Travel XY	301 mm x 501 mm (11.9 in. x 19.7 in.)
Resolution	0.2 µm (0.008 mils)
Repeatability	≤ 1 µm (0.04 mils)
Accuracy	Standard mode: ≤ 2 µm (0.08 mils), Precision mode: ≤ 0.3 µm (0.012 mils)
Speed	50 mm/sec (2 in./sec)
Bearings	Precision balls bearings
Motor-drive system	High-performance micro stepper motor
Feedback system	Ceramic ultra-low thermal expansion linear encoder

Z Stage	
Travel	10.0 mm (.39 in.)
Resolution	0.2 µm (0.008 mils)
Repeatability	≤ 1 µm (0.04 mils)
Accuracy	≤ 2 µm (0.08 mils)
Speed	20 mm/sec (0.8 in./sec)
Lifting capacity	20 kg (44 lb.)
Probe-force deflection (measured at the chuck edge)	≤ 0.0007 µm/µm slope per 10 kg load (0.0007 in./ in./22 lb)

Programmable Chuck Stage (continued)

Theta Stage	
Travel	± 3.75°
Resolution	0.2 µm (0.008 mils)*; 0.00008°
Repeatability	≤ 1 µm (0.04 mils)*; ≤ 0.0004°
Accuracy of fine correction	≤ 2 µm (0.08 mils)*; ≤ 0.0008°
Accuracy of large movement (>2°)	≤ 5 µm (0.20 mils)*; ≤ 0.0019°

* *Measured at edge of 300 mm chuck*

MicroChamber

Electrical	**CM300xi-F**	**CM300xi-S**
EMI shielding	> 30 dB (typical) @ 1 kHz to 1 MHz	> 20 dB (typical) @ 1 kHz to 1 MHz
Light attenuation	≥ 130 dB	≥ 130 dB
Spectral noise floor*	≤ -170 dBVrms/rtHz (≤ 1 MHz)	≤ -150 dBVrms/rtHz (≤ 1 MHz)
System AC noise**	≤ 5 mVp-p (≤ 1 GHz)	≤ 15 mVp-p (≤ 1 GHz)

* *Typical results. Actual values depend on probe / test setup. Test setup uses triaxial thermal chuck, 50 Ω termination, high quality LNA, and DSA/DSO instrument.*

** *Test setup: Station power ON, Thermal system ON (40°C), MicroChamber® closed. Instrument setup: Time domain digital scope (DC to 1 GHz), 50 Ω input impedance, cable to chuck BNC connector. Measurement: Peak-Peak Noise Voltage (acquire 1000 data points, and calculate mean of Vp-p data).*

Air-Purge Management	
Purge	Clean dry air (CDA)
Purge control	Manual or automatic (software controlled)
Nominal purge flow rate – Maintenance	80 liters/min (2.8 SCFM)
Nominal purge flow rate – Quick purge conditioning	240 liters/min (8.5 SCFM)

Platen System

Platen	
Dimensions	1058 mm (W) x 866 mm (D) x 25 mm (T)
Platen-to-chuck height	43.0 ± 0.5 mm (1.69 ± 0.02 in.)
Accessory mounting	Universal Rail System: 53 cm (21 in.) Left / Right Rail, 70 cm (28 in.) Rear Rail
Platen mount	Fixed height, High Thermal Stability kinematic mount
HTS Thermal Management	Integrated laminar-flow air-cooling for thermal expansion control

Platen Insert	
Dimension	720 mm x 720 mm x 38 mm (incl. guard for fully-shielded version)
Weight	47 kg (104 lb.)
Material	Steel for magnetic positioners
Surface finish	Fine ground for vacuum positioner high stability

Platen Cut-out	
Diameter	344 mm (13.5 in.)
Standard interface	Probe card holders, custom adapters and TopHat™

Platen System (continued)

Probe Card Holder*

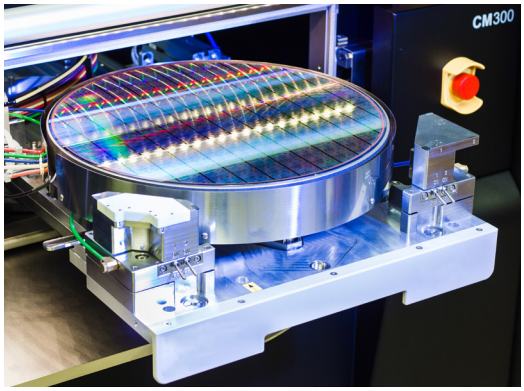
Probe card shape	Rectangular
Probe card width	114.5 mm (4.5 in.)
Max. probe card length (standard)	284 mm (11.18 in) /142 mm (5.59 in) from probe center to front/rear
Max. probe card length (HTS)	160 mm (6.30 in) / 80 mm (3.15 in) from probe center to front/rear
Tip drop**, (standard)	3.0 mm to 5.0 mm (0.12 in. to 0.20 in.)
Tip drop** (High Thermal Stability)	4.7 mm (0.185 in.)

* *For more details, please see the Probe Station Accessory Catalog.*

** *Tip drop corresponds to the vertical distance between mounting level (platen top side) and needle tips. Field of view of ContactView (side view) camera within +/- 0.5 mm from nominal value (4.7 mm)*

Wafer Chuck

Diameter	305 mm (12 in.)
Material	Nickel- or gold-plated aluminum
DUT sizes supported	Shards (10 mm x 10 mm or SEMI-M1 compliant wafers up to 300 mm / 12 in.)
Vacuum rings	7 mm, 66 mm, 130 mm, 180 mm, 280 mm
Vacuum-ring actuation	Software controlled (Center, 200 mm, 300 mm)
Planarity incl. stage movement (with active z-profiling)	+/-5 µm (0.2 mils)



Platform

General

Attenuation of the vibration damping system	0 dB @ 6Hz, 5 dB per octave @ 6Hz to 48Hz, 15 dB above 48Hz*
Stage damping	15 dB in less than 1500 m sec

* *Due to the sensitivity of measurements to vibrations, the CM300xi is equipped with a high-performance active vibration damping system. However, unacceptable equipment vibrations can occur when the floor vibrations are high. For this reason, the CM300xi must be used in an environment having background vibrations at or below the Operating Theatre level. This corresponds to a maximum level of 4000 micro-inches/sec (72 dB), measured using the 1/3-octave band velocity spectra method (expressed in RMS velocity as specified by The International Standards Organization [ISO]). For further information and technical solutions with environments using raised floors, please see the FormFactor Stations Facility guide. Damper natural frequency 2.5 Hz.*

Contact Intelligence Technology

The CM300xi provides the lab automation capabilities needed to make critical precision electrical measurements. With Contact Intelligence technology, CM300xi adapts to temperature variance and provides automated drift correction for unattended testing on small pads over time and temperature. Contact Intelligence technology is enabled by the following features:

- VueTrack™ closed-loop positioning capability minimizes the need of manual re-adjustment when probing small pads across multiple temperatures.
- Velox probe station software provides a single command interface for automated temperature transitions continuously managing the separation between probes and pad during temperature ramp.
- Velox probe station software provides the ability to optimize the soak time after a temperature transition or when stepping across the wafer based on the temperature variance.
- ReAlign offers the capability to perform automated probe to pad alignment and unattended testing over temperature using probe cards that do not allow unlimited top microscope view of probes and pads.
- High Thermal Stability (HTS) microscope bridge enables automated over-temperature measurements.
- HTS platen provides stability over a wide thermal probing range.
- HTS probe card holder ensures EMI-shielded and light-tight environment, achieving accurate and reliable small-pad probing (option).
- As an additional option, motorized positioners allow automatic drift correction for each probe individually and facilitate unattended testing on small pads across multiple temperatures using Vuetrack Pro or Auto RF. Motorized positioners are part of the Autonomous DC and Autonomous RF Measurement Assistants.

Platform (continued)

Communication Ports

Type	Qty	Location	Notes
USB 3.0	2	IPC front	For access to USB devices
GPIB IEEE 488.2	1	Rear connection panel	For test instrument control
LAN	1	Rear connection panel	For integration into measurement environment and local network
USB 3.0 USB 2.0 LAN	1 3 3	Front Font and rear Rear connection panel	For access to USB devices (IntelliControl option) For connecting customer equipment (IntelliControl option) For connecting customer equipment and local network (IntelliControl option)

Sound level

Constant level	≤ 60 dB (A)
Peak level	< 72 dB (A)

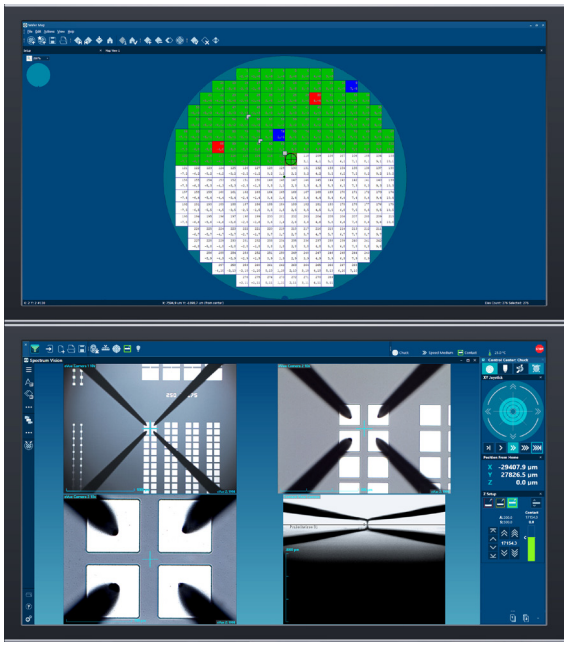
Station Controller PC and Software

The CM300xi is equipped with a high-performance controller PC including Velox probe station control software and Windows 10 operating system.

Velox Probe Station Control Software

Velox software provides all features and benefits required for semi- and fully-automated operation of the probe system, such as:

- **User-centered design:** Minimized training costs and enhanced efficiency.
- **Loader integration:** No need for any additional software. Easy creation of workflows and receipts.
- **Smart automation features:** Faster time to data due to reduced test cycle times.
- **Hundreds of tuneable options:** High flexibility for a large variety of applications.
- **Simplified operation for inexperienced users:** Reduced training costs with Workflow Guide and condensed graphical user interface.
- **Integrated Python Development Environment:** Including Syntax Highlighting, AutoComplete, Debugger, Integrated Documentation.
- **Velox Integration Tool Kit:** Enables integration of the prober into Customer Test Executives, supporting LabView, C++, C#, Visual Basic, MatLab.
- **Velox Interval Backup:** Automated Backup with easy-to-use recovery function. Data is stored on a separate HDD drive.



VeloxPro Package (Optional)

VeloxPro is a SEMI E95-compliant enhancement with test executive capabilities, featuring:

- **SEMI E95-compliant** probe station control software with condensed graphical user interface for simplified operation
- **Test executive software** enabling control of third-party measurement equipment via the probe station

Tester Interface

The CM300xi uses commands through GPIB as a permanent listener. The GPIB interface provides the ability to:

- Request an inventory of all wafers available in the cassettes
- Define a wafer map
- Define a job (out of wafers and recipe)
- Change chuck temperature and initiate re-alignment
- Receive notifications when the wafer is aligned and ready to test

Non-Thermal Chucks

FemtoGuard® Chuck Performance*

Breakdown Voltage**	Force-to-Guard	≥ 500 V
	Guard-to-Shield	≥ 500 V
	Force-to-Shield	≥ 500 V
Resistance***	Force-to-Guard	≥ 5 x 10^{12} Ω
	Guard-to-Shield	≥ 1 x 10^{12} Ω
	Force-to-Shield	≥ 5 x 10^{12} Ω
Capacitance****	Force-to-Guard	≤ 800 pF
	Guard-to-Shield	≤ 3000 pF

* *Chuck performance measured inside test chamber at dew point < -70°C.*

** *Breakdown voltage tested at 500 V DC*

*** *The chuck resistance is measured in a dry environment. Moisture in the chuck may degrade performance. The chuck layer resistance is measured with a B1500 with HR SMU B1517, the FormFactor program "F-G_R_@10V@50Hz" at defined test conditions.*

**** *The chuck layer capacitance is measured with a B1500 with HR-SMU B1517, the FormFactor program "CAP_F-G-300pA" at defined test conditions.*

System Electrical Performance (with non-thermal chuck)	CM300xi-F FemtoGuard	CM300xi-S FemtoGuard	CM300xi-S Coax Chuck
Probe leakage*	≤ 1 fA	≤ 1 fA	≤ 1 fA
Chuck leakage*	≤ 3 fA	≤ 15 fA	≤ 600 fA
Residual capacitance**	≤ 2.5 pF	≤ 75 pF	N/A
Capacitance variation**	≤ 2 fF	≤ 75 fF	≤ 75 fF
Settling time***	≤ 50 fA @ 0.5 sec	≤ 100 fA @ 2 sec	N/A

* *Overall leakage current is comprised of two distinctly separate components: 1) offset, and 2) noise. Offset is the DC value of current due to instrument voltage offset driving through isolation resistance. Noise is low-frequency ripple superimposed on top of offset and is due to disturbances in the probe station environment. Noise and leakage are measured with a B1500 with HR-SMU B1517 and the FormFactor program "DCN@10V" at defined test conditions.*

** *The residual (triaxial) chuck capacitance is measured with a B1500 with HR-SMU B1517 with the FormFactor progam "Cap-Trx-3pA" at defined test conditions on a CM300xi with standard TopHat installed.*
This is chuck capacitance variation based upon chuck position anywhere in the 300 mm area, as measured by a stationary DC probe.

*** *Settling time is measured with a B1500 with HR-SMU B1517 and the FormFactor program "ST_10V" at defined test conditions.*

Note: Results measured with thermal chuck at standard probing height (20,500 µm) with chuck in a dry environment. Moisture in the chuck may degrade performance.

Thermal Chucks

FemtoGuard® Chuck Performance* — **Thermal Chuck**

		@ -55°C	@ -40°C	@ 25°C	@ 200°C	@ 300°C
Breakdown Voltage**	Force -to-Guard	≥ 500 V	≥ 500 V	≥ 500 V	≥ 500 V	≥ 500 V
	Guard-to-Shield	≥ 500 V	≥ 500 V	≥ 500 V	≥ 500 V	≥ 500 V
	Force -to-Shield	≥ 500 V	≥ 500 V	≥ 500 V	≥ 500 V	≥ 500 V
Resistance***	Force -to-Guard	≥ 5 x 10^{12} Ω	≥ 5 x 10^{12} Ω	≥ 5 x 10^{12} Ω	≥ 5 x 10^{11} Ω	≥ 1 x 10^{11} Ω
	Guard-to-Shield	≥ 5 x 10^{11} Ω	≥ 5 x 10^{11} Ω	≥ 5 x 10^{11} Ω	≥ 5 x 10^{10} Ω	≥ 1 x 10^{10} Ω
	Force -to-Shield	≥ 5 x 10^{12} Ω	≥ 5 x 10^{12} Ω	≥ 5 x 10^{12} Ω	≥ 5 x 10^{11} Ω	≥ 1 x 10^{11} Ω
Capacitance****	Force -to-Guard	≤ 1100 pF	≤ 1100 pF	≤ 1100 pF	≤ 1100 pF	≤ 1200 pF
	Guard-to-Shield	≤ 5000 pF	≤ 5000 pF	≤ 5000 pF	≤ 5000 pF	≤ 5000 pF

* *Chuck performance measured inside test chamber at dew point < -70°C.*

** *Breakdown voltage tested at 500 V DC*

*** *The chuck resistance is measured in a dry environment. Moisture in the chuck may degrade performance. The chuck layer resistance is measured with a B1500 with HR SMU B1517, the FormFactor progam "F-G_R_@10V@50Hz" at defined test conditions.*

**** *The chuck layer capacitance is measured with a B1500 with HR-SMU B1517, the FormFactor progam "CAP_F-G-300pA" at defined test conditions.*

Thermal Chucks (continued)

Coaxial Chuck Performance*	**Thermal Chuck**				
	@ -55°C	@ -40°C	**@ 25°C**	**@ 200°C**	**@ 300°C**
Breakdown Voltage**	≥ 500 V	≥ 500 V	≥ 500 V	≥ 500 V	≥ 500 V
Resistance	≥ 5 x 10^{12} Ω	≥ 5 x 10^{12} Ω	≥ 5 x 10^{12} Ω	≥ 5 x 10^{11} Ω	≥ 5 x 10^{10} Ω
Capacitance	≤ 800 pF	≤ 800 pF	≤ 800 pF	≤ 800 pF	≤ 800 pF

* *Chuck performance measured inside test chamber at dew point < -70°C.*

** *Breakdown voltage tested at 500 V DC*

System Electrical Performance (With Thermal Chuck)		**CM300xi-F FemtoGuard**	**CM300xi-S FemtoGuard**	**CM300xi-S Coax**
Probe leakage*	Thermal Controller OFF	≤ 1 fA	≤ 1 fA	≤ 1 fA
	Thermal Controller ON	≤ 5 fA	≤ 10 fA	≤ 10 fA
Chuck leakage* (ATT)	Thermal Controller OFF	≤ 3 fA	≤ 15 fA	≤ 25 pA
	-55°C	≤ 6 fA	≤ 20 fA	≤ 25 pA
	-40°C	≤ 6 fA	≤ 20 fA	≤ 25 pA
	25°C	≤ 3 fA	≤ 20 fA	≤ 25 pA
	200°C	≤ 3 fA	≤ 20 fA	≤ 25 pA
	300°C	≤ 6 fA	≤ 25 fA	≤ 220 pA
Residual capacitance**		≤ 2.5 pF	≤ 75 pF	N/A
Capacitance variation**		≤ 2 fF	≤ 75 fF	≤ 75 fF
Settling time***	All temperatures @ 10 V	≤ 50 fA @ 0.5 sec	≤ 100 fA @ 2 sec	N/A

* *Overall leakage current is comprised of two distinctly separate components: 1) offset, and 2) noise. Offset is the DC value of current due to instrument voltage offset driving through isolation resistance. Noise is low-frequency ripple superimposed on top of offset and is due to disturbances in the probe station environment.Noise and leakage are measured with a B1500 with HR-SMU B1517 and the FormFactor program "DCN@10V" at defined test conditions.*

** *The residual (triaxial) chuck capacitance is measured with a B1500 with HR-SMU B1517 with the FormFactor progam "Cap-Trx-3pA" at defined test conditions on a CM300xi with standard TopHat installed. This is chuck capacitance variation based upon chuck position anywhere in the 300 mm area, as measured by a stationary DC probe.*

*** *Settling time is measured with a B1500 with HR-SMU B1517 and the FormFactor program "ST_10V" at defined test conditions.*

Thermal System Performance

Thermal System Overview

Temperature ranges	-60°C to 300°C, ATT, air cool	(TS-426-14E/R, TS-416-14E/R)
	-40°C to 300°C, ATT, air cool	(TS-426-08P/R)
	+20°C to 300°C, ATT, air cool	(TS-416-05T)
	+30°C to 300°C, ATT, air cool	(TS-416-02T)
Wafer temperature accuracy[1,2]	± 2.5°C at 100°C	

1. *As measured with an Anritsu WE-11K-TSI-ANP or WE-12K-GW1-ANP type K thermocouple surface temperature measurement probe with offset calibration procedure. Conditions: closed chamber with minimum recommended purge air, probe centered on a blank silicon wafer, chuck at center of travel and standard probe height. Typical type K thermocouple probe tolerances are ±2.2°C or ±0.75% of the measured temperature in °C (whichever is greater).*
2. *The test setup can change the wafer temperature accuracy from the calibration by ±5°C (typical). Test setup attributes include open or closed chamber, probe or probe card construction and number of contacts, purge air flow rate, and lab environmental conditions.*

Thermal System Performance (continued)

ATT Thermal System Specifications (-60°C to 300°C) – TS-426-14E/R	
Temperature range	-60°C to 300°C
Temperature control	Pt100 (in Chuck)
Resolution	0.1°C
Thermal uniformity[1, 2]	1.0°C @ 25°C, 2.0°C @ -60°C, 3.0°C @ 300°C

1. *As measured with type-K thermocouple surface probe. Conditions: 12 mm diameter probe head, closed chamber with minimum recommended purge air, probe centered in probing area, on standard silicon wafer, and chuck at standard probe height. Typical type K thermocouple probe tolerances are ±2.2°C or ±0.75% of the measured temperature in °C (whichever is greater).*
2. *Peak-to-peak temperature measurement variation across probing sites.*

ATT Transition Time (Typical)*		Standard Mode	ECO Mode
Cooling	25°C to -40°C	17 min	34 min
	25°C to -60°C	53 min	N/A
	200°C to 25°C	18 min	27 min
	300°C to 25°C	33 min	44 min
Heating	-60°C to 25°C	7 min	N/A
	-40°C to 25°C	5 min	5 min
	25°C to 200°C	19 min	19 min
	25°C to 300°C	35 min	35 min

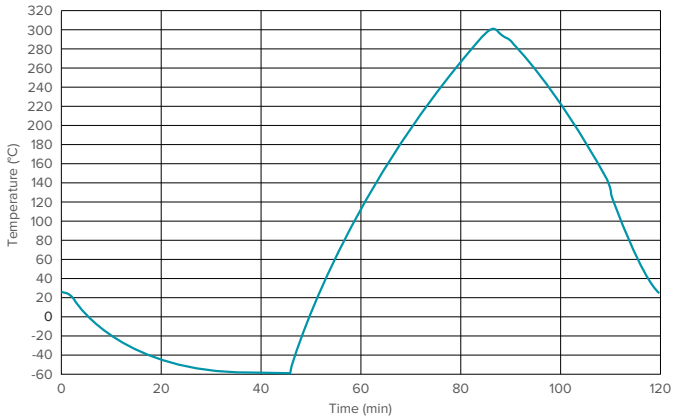
* *Performance valid within fulfilled facility media requirements as stated in the Facility Planning Guide.*

** *Eco mode limits the CDA consumption of the chuck to max. 315 l/min*

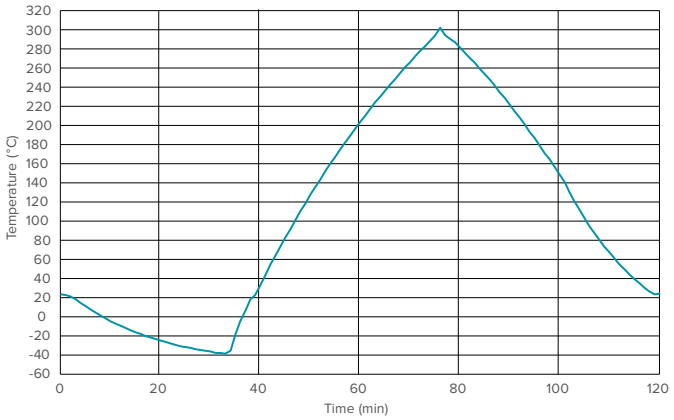
ATT Thermal Transition Time (-60°C to 300°C)

Typical times using CM300xi with FemtoGuard Chuck

Standard Mode



ECO Mode



Thermal System Performance (continued)

ATT Thermal System Specifications (-40°C to 300°C) – TS-426-08P/R

Temperature range	-40°C to 300°C
Resolution	0.1°C
Thermal uniformity[1, 2]	1.0°C @ 25°C, 2.0°C @ -40°C, 3.0°C @ 300°C

1. *As measured with type-K thermocouple surface probe. Conditions: 12 mm diameter probe head, closed chamber with minimum recommended purge air, probe centered in probing area, on standard silicon wafer, and chuck at standard probe height. Typical type K thermocouple probe tolerances are ±2.2°C or ±0.75% of the measured temperature in °C (whichever is greater).*
2. *Peak-to-peak temperature measurement variation across probing sites.*

ATT Transition Time (Typical)*		**Standard Mode****	**Power Mode*****
Cooling	25°C to -40°C	59 min	49 min
	200°C to 25°C	28 min	24 min
	300°C to 25°C	35 min	31 min
Heating	-40°C to 25°C	5 min	5 min
	25°C to 200°C	19 min	19 min
	25°C to 300°C	35 min	35 min

* *Performance valid within fulfilled facility media requirements as stated in the Facility Planning Guide.*

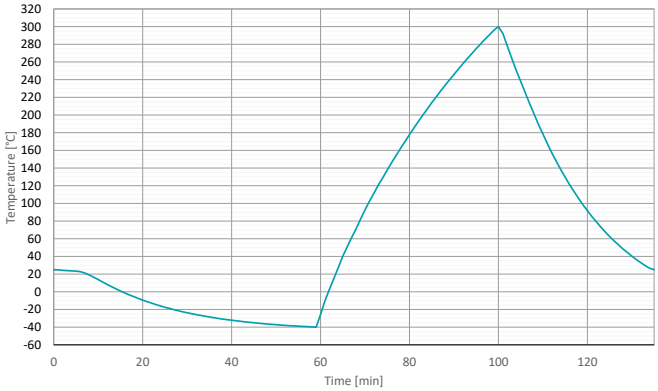
** *Standard Mode limits CDA consumption to max. 300 l/min.*

*** *Power Mode limits CDA consumption to max. 400 l/min.*

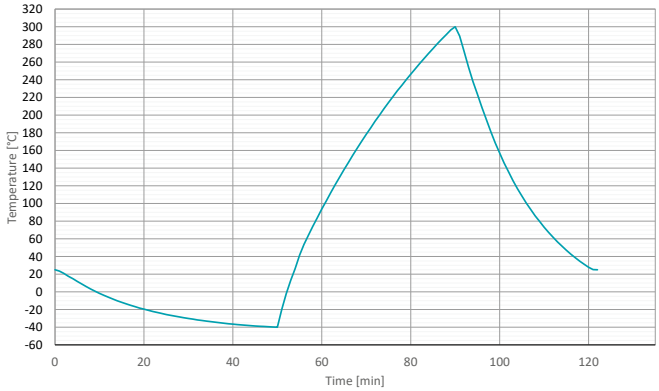
ATT Thermal Transition Time (-40°C to 300°C)

Typical times using CM300xi with FemtoGuard Chuck

Standard Mode



Power Mode



Thermal System Performance (continued)

ATT Thermal System Specifications (30°C to 300°C) – TS-416-02T

Temperature range	30°C to 300°C
Resolution	0.1°C
Thermal uniformity[1, 2]	1.0°C @ 25°C, 3.0°C @ 300°C

1. *As measured with type-K thermocouple surface probe. Conditions: 12 mm diameter probe head, closed chamber with minimum recommended purge air, probe centered in probing area, on standard silicon wafer, and chuck at standard probe height. Typical type K thermocouple probe tolerances are ±2.2°C or ±0.75% of the measured temperature in °C (whichever is greater).*
2. *Peak-to-peak temperature measurement variation across probing sites.*

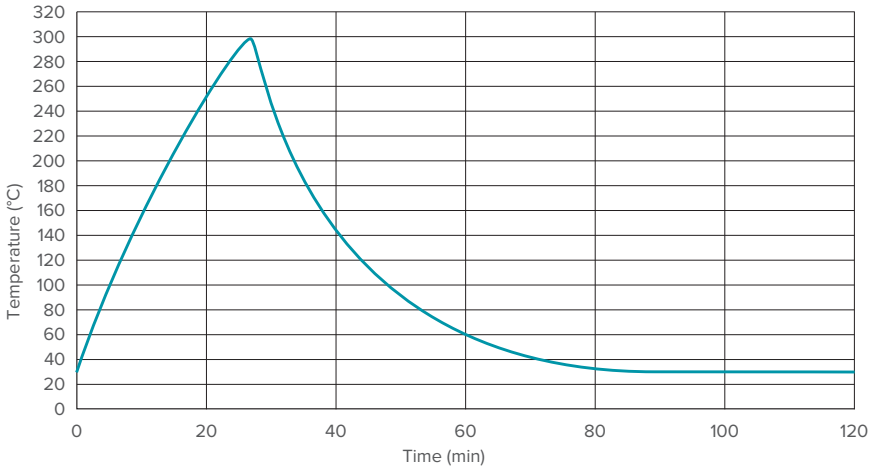
ATT Transition Time (Typical)*

Cooling	200°C to 30°C	60 min
	300°C to 30°C	70 min
Heating	30°C to 200°C	19 min
	30°C to 300°C	35 min

* *Performance valid within fulfilled facility media requirements as stated in the Facility Planning Guide.*

ATT Thermal Transition Time (30°C to 300°C)

Typical times using CM300xi with FemtoGuard Chuck



Microscope Bridges/Transports

Progammable High Temperature Stability (HTS) Microscope Bridge for eVue Microscope System	
Travel	75 mm (X) x 75 mm (Y) x 150 mm (Z) (3.0 in. x 3.0 in. x 5.9 in.)
Travel in TopHat	26 mm x 26 mm (1 in. x 1 in.)
Z Lift	150 mm (5.9 in.)
Resolution, X-Y axis	1 µm (0.04 mils)
Resolution, Z axis	0.4 µm (0.016 mils)
Repeatability, X-Y axis	≤ 2 µm (0.08mils)
Repeatability, Z axis	≤ 1 µm (0.04mils)
Accuracy, X-Y axis	≤ 5 µm (0.2 mils)
Accuracy, Z axis	≤ 4 µm (0.016 mils)
Speed	5 mm/sec (0.2 in./sec)

Progammable Large Area Transport/Microscope Bridge	
Travel	300 mm (X) x 300 mm (Y) x 150 mm (Z) (12 in. x 12 in. x 5.9 in.)
Travel in TopHat	26 mm x 26 mm (1 in. x 1 in.)
Z Lift	150 mm (5.9 in.)
Resolution, X-Y axis	1 µm (0.04 mils)
Resolution, Z axis	0.4 µm (0.016 mils)
Repeatability, X-Y axis	≤ 5 µm (0.2 mils)
Repeatability, Z axis	≤ 2 µm (0.08 mils)
Accuracy, X-Y axis	≤ 10 µm (0.4 mils)
Speed	50 mm/sec (2 in./sec)
Planarity compensated	± 5 µm (0.2 mils)

Aux Chuck

Left-side Aux Chuck	Ceramic vacuum chuck optimized for RF calibration
	Two 22 x 22 mm^2 substrates
	Stop pins as alignment aid
Right-side Aux Chuck	Steel vacuum chuck optimized for cleaning
	Two 16 x 14.5 mm^2 substrates, 38.1 x 38.1 mm^2 area for self-adhering gel pad
	Stop pins as alignment aid
Planarity	+/- 5 µm, adjustable
Thermal isolation	Air gap, > 10 mm
Positional repeatability	2 µm (0.08 mils) after rollout event
Vacuum actuation	Independent manual vacuum switches

Models

CM300xi Fully-shielded - Probe station platform, semi-automated with MicroChamber, AttoGuard and PureLine technologies

Standard configuration includes:

Programmable HTS Microscope Bridge 75 mm x 75 mm

EMI- and light-tight shielding with TopHat, AttoGuard technology for accurate IV/CV measurements

ContactView™ East-West with ProbeHorizon for observation of probes and wafer from the side, enabling safe adjustment of contact height

AUX chuck kit for RF calibration and cleaning

Velox Controller with dual TFT monitor 24” on ergo arm

IntelliControl including USB3 port to Velox Controller PC at front, 3x USB ports for connecting customer equipment, 3 additional LAN ports for connecting equipment, Air gun and Vacuum connection.

CM300xi Shielded - Probe station platform, semi-automated with MicroChamber

Standard configuration includes:

Programmable HTS Microscope Bridge 75 mm x 75 mm

EMI- and light-tight shielding with TopHat

ContactView East-West with ProbeHorizon for observation of probes and wafer from the side, enabling safe adjustment of contact height

Velox Controller with dual TFT monitor 24” on ergo arm

Options

Note: To complete the CM300xi probe system configuration

1. Select a modular chuck from the list on the next page (X=1 f or Nickel-plated chuck and 2 for Gold-plated)

2. Select additions/options from the following list (see compatibility chart on following page)

Part Number	General Description	CM300xi-F	CM300xi-S
171-294	Microscope bridge/transport HTS – programmable 75 mm x 75 mm	Std	Std
168-930	Large area microscope bridge/transport – programmable 300 mm x 300 mm	●	●
161-677	Aux Chuck Kit including CAL chuck (left) and CLEAN chuck (right)	Std	●
780-00172	IntelliControl, including Airgun, Vacuum connection, additional LAN and USB ports	Std	●
167-500	AirGun and Vacuum connection at front		●
780-00352	Additional ContactView (side view camera) in North/South direction	●	●
190-499	ReAlign/Off-axis PTPA including chuck and platen camera, ReAlign SW license	●	●
161-676	CM300xi/CM300-O, 2nd TFT monitor 24” with ergo arm	Std	●
186-000	3D Manual Controls, including XY Knobs and Platen Lift - provides extremely intuitive, rapid and precise manual control of the stage in X, Y and Z direction	●	●
OPT-CM300-TOPCHMBR	CM300xi, TopChambers for simultaneous use with probe card and positioners (EMI-shielded)	●	●

Models (Continued)

Non-Thermal Chucks

Part Number	General Description	Chuck Compatibility CM300xi-F	CM300xi-S
TC-006-30x	FemtoGuard triaxial chuck, non-thermal, 300 mm (12”)	●	●
TC-006-10x	Coaxial chuck, non-thermal, 300 mm (12”)		●

Note: X = 1 (Nickel), X = 2 (Gold)

Thermal Chucks

Part Number	General Description	Chuck Compatibility CM300xi-F	CM300xi-S
TC-426-30x	FemtoGuard triaxial chuck, thermal, -60°C to 300°C (ATT), 300 mm (12”)	●	●
TC-426-10x	Coaxial chuck, thermal, -60°C to +300°C (ATT) , 300 mm (12”)		●

Note: All thermal chucks are available with either Ni (x=5) or Au (x=6) plating. Thermal Chucks require a thermal system for operation at a controlled temperature.

Thermal Systems

Part Number	General Description	Compatibility CM300xi-F	CM300xi-S
TS-426-14E	Thermal System, -60°C to 300°C, ATT (220-240 VAC 50 Hz), CDA-saving, requires CDA dew point <-80°C	●	●
TS-426-14R	Thermal System, -60°C to 300°C, ATT (200-220 VAC 60 Hz, 200 VAC 50 Hz), CDA-saving, requires CDA dew point <-80°C	●	●
TS-416-14E	Thermal System, -60°C to 300°C, ATT (220-240 VAC 50 Hz), with air dryer	●	●
TS-416-14R	Thermal System, -60°C to 300°C, ATT (200-220 VAC 60 Hz, 200 VAC 50 Hz), with air dryer	●	●
TS-426-08P	Thermal System, -40°C to 300°C, ATT (200-240 VAC 50/60 Hz), CDA-saving, requires CDA dew point <-70°C	●	●
TS-426-08R	Thermal System, -40°C to 300°C, ATT (208-230 VAC 60 Hz), CDA-saving, requires CDA dew point <-70°C, UL-certified	●	●
TS-416-05T	Thermal System, +20 to 300°C, ATT (100-230 VAC 50/60Hz)	●	●
TS-416-02T	Thermal System, +30 to 300°C, ATT (100-230 VAC 50/60Hz)	●	●

Note: Thermal systems must match the thermal chuck selected, i.e. TS-416-xxx and TS-426-xxx thermal systems are compatible with TC-426-xxx chucks. The upper temperature limit is defined by the chuck.

CM300xi fully-automated system with material handling unit MHU301.

CM300xi fully-automated system with material handling unit MHU300, showing dual load port configuration.

Wafer Loaders MHU300 and MHU301

Material handling unit	The footprint-optimized MHU301 or the powerfull MHU300 can be configured to provide fully automated testing. Both offer automated loading of the probe system with 200 mm and 300 mm SEMI spec wafers from FOUP/FOSB cassettes. The MHU301 comes with one SEMI standard load port, whereas the MHU300 can be configured with up to two load ports. Manual loading of wafer fragments (> 10 mm x 10 mm), as well as full wafers, are supported through manual loading of the prober, which bypasses the MHU.
Dual-prober ready	For the MHU300 up to two probe systems can be docked and operated simultaneously to a single central loader.
Wafer Cassettes	SEMI-compliant FOUP/FOSB cassettes (SEMI E47.1 , SEMI M31)*
Wafers	SEMI M1 compliant
Wafer ID Reading	The probe system has the optional ability to automatically identify wafers. Wafers are identified by a barcode [BC 412 (SEMI T1-95 Standard] and IBM 412, OCR text [SEMI M12, M13 and M1.15 Standard], IBM, Triple and OCR-A fonts or 2D code [Data Matrix (T7 and M1.15 Standard)] at the top or bottom side of the wafer.

**Tested on Entegris F300 Autopod (300 mm) and Entegris 198/192 (200 mm)*

Configuration Options

Semi-Automated

Stand-alone CM300xi probe system with no integrated wafer loader

Fully-Automated

Wafer loader MHU301 interfaced to one CM300xi probe system (at left or right side)

Dual-Prober

Wafer loader MHU300 interfaced to two independent CM300xi probe systems

Notes: For detailed facility requirements, refer to the CM300xi Facility Planning Guide.
The MHU300 is also available for only one CM300. It can be later upgraded for two probe systems.

System Upgrade Options

MHU-ready option:

OPT-CM300-MHU-L/R	Upgrade capability for conversion of a CM300xi to fully-automated probe system, requires definition of prober location against MHU; feature is required to prepare a CM300xi for later upgrade in the field.

Non-Thermal Chucks		**Chuck Compatibility**	
Part Number	**General Description**	**CM300xi-F**	**CM300xi-S**
TC-006-32x	FemtoGuard triaxial chuck, non-thermal, 300 mm (12”), with lift pins	●	●
TC-006-12x	Coaxial chuck, non-thermal, 300 mm (12”), with lift pins		●

Thermal Chucks*		**Chuck Compatibility**	
Part Number	**General Description**	**CM300xi-F**	**CM300xi-S**
TC-426-33x	FemtoGuard triaxial chuck, thermal, -60°C to +300°C (ATT), 300 mm (12”), with HT lift pins	●	●
TC-426-13x	Coaxial chuck, thermal, -60°C to +300°C (ATT), 300 mm (12”), with HT lift pins		●

Note: X = 5 (Nickel), X = 6 (Gold)

* *Thermal chucks require thermal systems to control chuck temperature. The chucks and thermal systems mutually determine the temperature range.*

Thermal Systems		**Compatibility**	
Part Number	**General Description**	**CM300xi-F**	**CM300xi-S**
TS-426-14E-I	Thermal system, -60°C to 300°C, ATT (220-240 VAC 50 Hz) to be used with MHU300, requires CDA dew point <-80°C	●	●
TS-426-14R-I	Thermal system, -60°C to 300°C, ATT (200-220 VAC 60 Hz, 200 VAC 50 Hz) to be used with MHU300, requires CDA dew point <-80°C	●	●
TS-416-14E-I	Thermal system, -60°C to 300°C, ATT (220-240 VAC 50 Hz) to be used with MHU300, with air dryer	●	●
TS-416-14R-I	Thermal system, -60°C to 300°C, ATT (200-220 VAC 60 Hz, 200 VAC 50 Hz) to be used with MHU300, with air dryer	●	●

Available options

Automation with MHU301

MHU301-L/R	Material handling unit with one load port for 300 mm FOUP/FOSB cassettes, for CM300xi at left (-L) or right (-R) side
180-402	Open Cassette Adapter for 200mm Wafer Cassettes
182-825	Wafer ID reader for reading optical codes on top side of wafer
183-038	Wafer ID reader for reading optical codes on back side of wafer (from bottom)
182-826	Wafer ID reader for reading optical codes on top and back side of wafer
183-820	Fan Filter unit for MHU301 reducing dust pollution level inside MHU
183-027	Quick Access Port: Additional storage for 2 wafers for faster testing

CM300xi fully-automated system with material handling unit MHU301.

Automation with MHU300

MHU300-L/R	Material handling unit with one load port for 300 mm FOUP/FOSB cassettes, for CM300xi at left (-L) or right (-R) side
MHU300-2	Material handling unit with one load port for 300 mm FOUP/FOSB cassettes for two CM300xi probe systems (dual-prober configuration)
180-410	Second load port for MHU300
180-402	Adapter for use of open 200 mm cassettes
159-660	Wafer ID reader for reading optical codes on top and back side of wafer
164-678	Fan filter unit for MHU300 reducing dust pollution level in MHU

CM300xi fully-automated system with material handling unit MHU300, showing dual-prober configuration.

System Throughput

Semi-automated system

Chuck stepping time	≤ 0.75 sec (200 µm Z down – 1000 µm X-Y – 200 µm Z up)

Fully-automated system

FOUP cassette load*	≤ 30 sec (incl. wafer scan)
Wafer handling cycle @ ambient	≤ 1.3 min (Cassette ➔ PreAligner ➔ Prober ➔ Cassette) ≤ 1.6 min (Cassette ➔ PreAligner ➔ IDReader ➔ PreAligner ➔ Prober ➔ Cassette)

**Tested on Entegris F300 Autopod*

Regulatory Compliance

Certification	CE declared, 3rd party tested for CB against IEC 61010 including National Standard CSA C22.2 No. 61010-1-12 / UL 61010-1:2012, certified for US and Canada (cNRTLus), SEMI S2 and S8. Copies of certificates are available on request.

Warranty

Warranty*	Fifteen months from date of delivery or twelve months from date of installation
Service contracts	Single- and multi-year programs available to suit your needs

** All performance metrics identified in this document are valid only when the system is installed and operated within the terms specified in the Facility Planning Guide.*

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CM300xi-DS-0622