

Cascade

CM300xi

300 mm Semi-/ Fully-automated Probe System

000111100010

Overview

The Cascade CM300xi 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.



Features / Benefits

Higher efficiency and lower cost of test	<ul style="list-style-type: none">Scalable from semi-automated operation to fully-automated prober or dual-prober system
High accuracy and repeatability	<ul style="list-style-type: none">Superior low-leakage and low-noise measurementsSafe and accurate hands-off testing with reliable and repeatable contact
Automated test	<ul style="list-style-type: none">Contact Intelligence enables unattended tests on small padsThermally induced drift can be automatically corrected, enabling 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	<ul style="list-style-type: none">Fast delivery of a wide variety of precise model parameters to enhance process and device development
Flexibility	<ul style="list-style-type: none">DC, AC and RF/microwave device characterization, 1/f, WLR, FA and design debugFull thermal range of -60°C to +300°C, supported by high thermal stability designUsage 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

Prober System

The CM300 probe system (base platform) is available in three different configurations:

CM300xi-F	CM300xi, fully-shielded	EMI-shielded system for low-current and low-noise measurements (full thermal range)
CM300xi-S	CM300xi, shielded	Shielded system for low-temperature and dark environment (full thermal range)
CM300-O	CM300*, open	Open system for ambient or above ambient temperature usage

* The CM300 open system is not equipped with the Contact Intelligence technology.

Mechanical Performance

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	$\leq 1 \mu\text{m}$ (0.04 mils)
Accuracy	Standard mode: $\leq 2 \mu\text{m}$ (0.08 mils), Precision mode: $\leq 0.3 \mu\text{m}$ (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	$\leq 1 \mu\text{m}$ (0.04 mils)
Accuracy	$\leq 2 \mu\text{m}$ (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)	$\leq 0.0007 \mu\text{m}/\mu\text{m}$ slope per 10 kg load (0.0007 in./ in./22 lb)

Theta Stage

Travel	$\pm 3.75^\circ$
Resolution	0.2 μm (0.008 mils)*; 0.00008°
Repeatability	$\leq 1 \mu\text{m}$ (0.04 mils)*; $\leq 0.0004^\circ$
Accuracy of fine correction	$\leq 2 \mu\text{m}$ (0.08 mils)*; $\leq 0.0008^\circ$
Accuracy of large movement ($>2^\circ$)	$\leq 5 \mu\text{m}$ (0.20 mils)*; $\leq 0.0019^\circ$

* 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)****	≤ 20 mVp-p (≤ 1 GHz) ***

* Available for CM300xi-F and CM300xi-S only.

** Test setup uses triaxial thermal chuck, 50 Ω termination, high-quality LNA, and DSA /DSO instrument.

*** Typical results. Actual values depend on probe/test setup.

**** 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*

* Available for CM300xi-F and CM300xi-S only.

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™

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.

** Measured vertical step from mounting level to needle tips. Side view camera tolerates ± 0.5 mm deviation from nominal value.

➤ 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*	≤ 10 μm (0.4 mils) @ 25°C
	≤ 30 μm (1.2 mils) @ -55°C
	≤ 30 μm (1.2 mils) @ 200°C
	≤ 40 μm (1.6 mils) @ 300°C

* With active z-profiling.

➤ 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.

* CM300 open systems are not equipped with Contact Intelligence technology

> Platform (continued)

Software

The CM300xi is equipped with Velox probe station control software. VeloxPro can be added optionally for SEMI E95 compliance and test executive capabilities. Operating system is Windows 10.

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.
- **Windows 10 compatible:** Highest performance and safe operation with state-of-the-art hardware.
- **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.

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
-

Communication Ports

Type	Qty	Location	Notes
USB 2.0	1	IPC front	For quick access to USB devices
USB 2.0	4	IntelliControl (option)	For security keys (1x) and USB instrument control (3x)
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

Sound level

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

> Station Controller

High-performance system controller with Velox probe station control software and Windows 10 OS

> 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	CM300-0 Coax Chuck
Probe leakage*	≤ 1 fA	≤ 1 fA	≤ 1 fA	N/A
Chuck leakage*	≤ 3 fA	≤ 15 fA	≤ 600 fA	≤ 1 pA
Residual capacitance	≤ 2.5 pF	≤ 75 pF	N/A	N/A
Capacitance variation**	≤ 2 fF	≤ 75 fF	≤ 75 fF	N/A
Settling time***	≤ 50 fA @ 0.5 sec	≤ 100 fA @ 2 sec	N/A	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 program "Cap-Trx-3pA" at defined test conditions. 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				
	Guard-to-Shield	≥ 500 V				
	Force -to-Shield	≥ 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				

* 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.

➤ Thermal Chucks (continued)

Coaxial Chuck Performance*	Thermal Chuck				
	@ -55°C	@ -40°C	@ 25°C	@ 200°C	@ 300°C
Breakdown Voltage**	≥ 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				

* 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	CM300-O Coax
Probe leakage*	Thermal Controller OFF	≤ 1 fA	≤ 1 fA	≤ 1 fA	N/A
	Thermal Controller ON	≤ 5 fA	≤ 10 fA	≤ 10 fA	N/A
Chuck leakage* (ATT)	Thermal Controller OFF	≤ 3 fA	≤ 15 fA	≤ 25 pA	≤ 100 pA
	-55°C	≤ 6 fA	≤ 20 fA	≤ 25 pA	N/A****
	-40°C	≤ 6 fA	≤ 20 fA	≤ 25 pA	N/A****
	25°C	≤ 3 fA	≤ 20 fA	≤ 25 pA	≤ 100 pA
	200°C	≤ 3 fA	≤ 20 fA	≤ 25 pA	≤ 100 pA
	300°C	≤ 6 fA	≤ 25 fA	≤ 220 pA	≤ 1 nA
Residual capacitance**		≤ 2.5 pF	≤ 75 pF	N/A	N/A
Capacitance variation**		≤ 2 fF	≤ 75 fF	≤ 75 fF	N/A
Settling time***	All temperatures @ 10 V	≤ 50 fA @ 0.5 sec	≤ 100 fA @ 2 sec	N/A	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 program "Cap-Trx-3pA" at defined test conditions. 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.

**** For CM300-O: Thermal chucks can be used for above ambient temperatures only.

➤ Thermal System Performance

Thermal System Overview¹

Temperature ranges	-60°C to 300°C, ATT, air cool (200/230 VAC 50/60 Hz)	(TS-426/416-14E/R)
	-40°C to 300°C, ATT, air cool (200/230 VAC 50/60 Hz)	(TS-426-08P/R)
	+20°C to 300°C, ATT, air cool (100/230 VAC 50/60 Hz)	(TS-416-05T)
	+30°C to 300°C, ATT, air cool (100/230 VAC 50/60 Hz)	(TS-416-02T)
Wafer temperature accuracy ^{2,3}	± 2.5°C at 100°C	

1. CM300-O can be used for above ambient temperatures only.

2. 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).

3. 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
Resolution	0.1°C
Thermal uniformity ^{1,2}	1.0°C @ 25°C, 2.0°C @ -60°C, 3.0°C @ 300°C

- 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 $\pm 2.2^\circ\text{C}$ or $\pm 0.75\%$ of the measured temperature in $^\circ\text{C}$ (whichever is greater).
- Peak-to-peak temperature measurement variation across probing sites.

ATT Transition Time (Typical)*

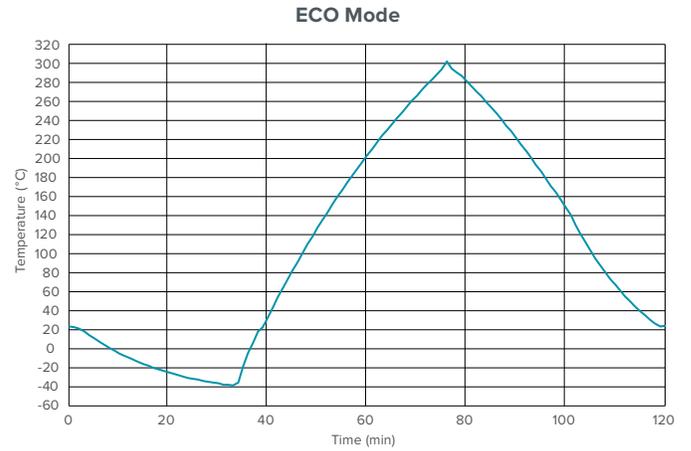
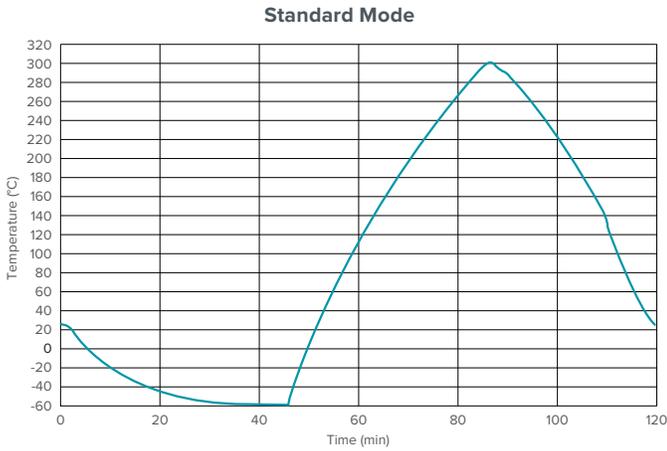
		Standard Mode	ECO Mode
Cooling	25°C to -40°C	17 min	34 min
	25°C to -60°C	53 min	N/A
	200°C to 25°C	18 min	27 min
	300°C to 25°C	33 min	44 min
Heating	-60°C to 25°C	7 min	N/A
	-40°C to 25°C	5 min	5 min
	25°C to 200°C	19 min	19 min
	25°C to 300°C	35 min	35 min

* 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



➤ 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 $\pm 2.2^\circ\text{C}$ or $\pm 0.75\%$ of the measured temperature in $^\circ\text{C}$ (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

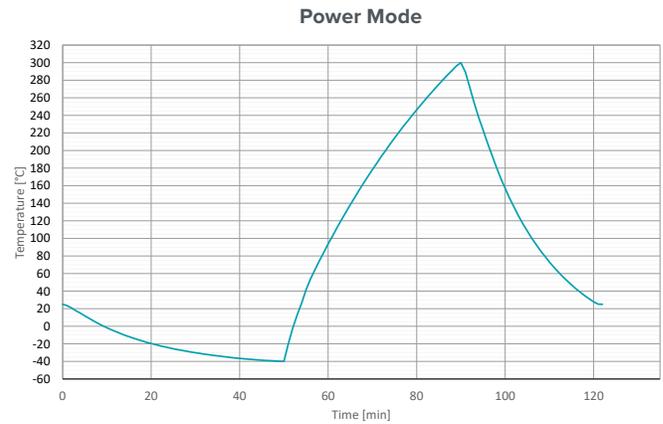
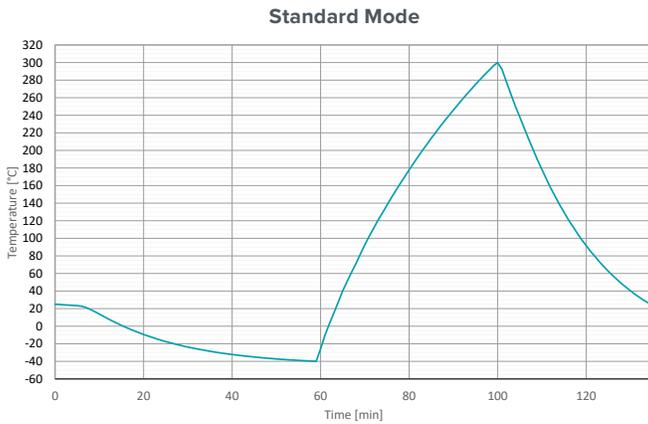
* Performance valid within fulfilled facility media requirements as stated in the Facility Planning Guide.

** 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



➤ 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 $\pm 2.2^\circ\text{C}$ or $\pm 0.75\%$ of the measured temperature in $^\circ\text{C}$ (whichever is greater).
2. Peak-to-peak temperature measurement variation across probing sites.

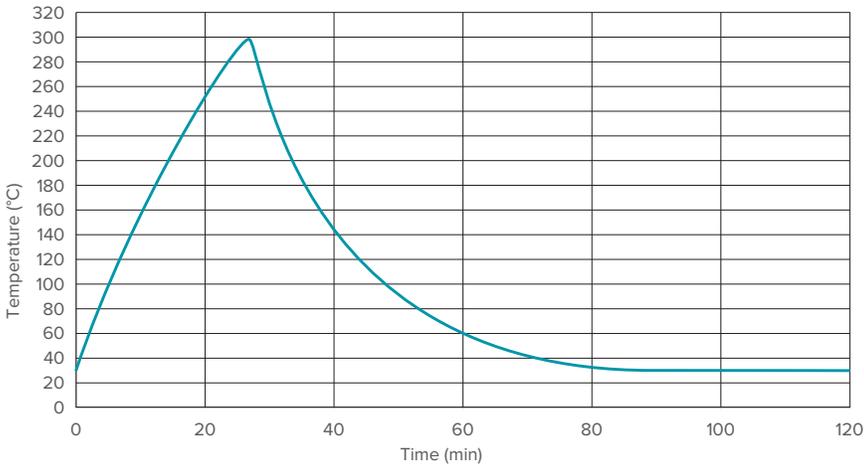
ATT Transition Time (Typical)*

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



➤ Mount/Transports

Programmable Bridge/Transport Specifications, High-Temperature Stability*

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	$\leq 2 \mu\text{m}$ (0.08mils)
Repeatability, Z axis	$\leq 1 \mu\text{m}$ (0.04mils)
Accuracy, X-Y axis	$\leq 5 \mu\text{m}$ (0.2 mils)
Accuracy, Z axis	$\leq 4 \mu\text{m}$ (0.016 mils)
Speed	5 mm/sec (0.2 in./sec)

Large Area Programmable Bridge/Transport Specifications*

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	$\leq 5 \mu\text{m}$ (0.2 mils)
Repeatability, Z axis	$\leq 2 \mu\text{m}$ (0.08 mils)
Accuracy, X-Y axis	$\leq 10 \mu\text{m}$ (0.4 mils)
Speed	50 mm/sec (2 in./sec)
Planarity compensated	$\pm 5 \mu\text{m}$ (0.2 mils)

Manual Bridge/Transport Specifications (for CM300-O)**

Travel	50 mm (X) x 50 mm (Y) x 125 mm (Z) (2.0 in. x 2.0 in. x 4.9 in.)
Z Lift	125 mm (4.9 in.)
Feature resolution, X-Y axis	5 μm (0.2 mils)

* Applicable with eVue only

** Only for use with microscope with focus drive.

➤ Aux Chuck

Quantity	Two separated chucks for RF calibration (CAL, two sites) and cleaning (CLEAN, three sites), mounted independent of the thermal chuck
Max substrate size CAL	22.15 mm x 22.15 mm ISS substrate 16 mm x 14.5 mm Square substrate
Max substrate size CLEAN	38.1 mm x 38.1 mm gel pad Two 16 mm x 14.5 mm contact pads, solid clean pad, brush
Material	CAL: ceramic, CLEAN: steel
Flatness	$\leq \pm 10 \mu\text{m}$ (0.39 mils)
Thermal isolation	Air gap, > 10 mm
Positional repeatability	2 μm (0.08 mils) after rollout event
Vacuum actuation	Independent manual control

Models

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

Configuration includes:

Microscope Bridge/Transport – programmable 75 mm x 75 mm, High Thermal Stability

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

ContactView™ East-West with ProbeHorizon for fast and safe wafer loading

AUX chuck kit for RF calibration and cleaning

Velox Controller with dual TFT monitor 24" on ergo arm

AirGun with front access, IntelliControl

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

Configuration includes:

Microscope Bridge / Transport – programmable 75 mm x 75 mm, High Thermal Stability

EMI- and light-tight shielding with TopHat

ContactView East-West with ProbeHorizon for fast and safe wafer loading

Velox Controller with single TFT monitor 24" on ergo arm

CM300 Open System - Probe station platform, semi-automated

Configuration includes:

Microscope Bridge / Transport – manual 50 mm x 50 mm

ContactView East-West with ProbeHorizon for fast and safe wafer loading

Velox Controller with single 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	CM300-O
171-294	CM300xi, microscope bridge/transport HTS – programmable 75 mm x 75 mm	Std	Std	●
168-930	CM300xi/CM300-O, large area microscope bridge/transport – programmable 300 mm x 300 mm	●	●	●
169-120	CM300-O, microscope bridge/transport – manual 50 mm x 50 mm			Std
161-677	CM300xi/CM300-O, AUX chuck kit	Std	●	●
167-640	CM300xi/CM300-O, AirGun with front access, IntelliControl	Std	●	●
167-500	CM300xi/CM300-O, AirGun with front access		●	●
163-262	CM300xi/CM300-O, 2 nd ContactView North-South	●	●	●
169-121	CM300xi/CM300-O, Option PTPA for CM300	●	●	●
161-676	CM300xi/CM300-O, 2 nd 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)	●	●	
VeloxPro	Software option, VeloxPro Test Automation Software for 300 mm systems (included if system ordered with MHU)	●	●	●

Models (Continued)

Non-Thermal Chucks

Part Number	General Description	Chuck Compatibility		
		CM300xi-F	CM300xi-S	CM300-O
TC-006-30x	FemtoGuard triaxial chuck, non-thermal, 300 mm (12")	●	●	
TC-006-10x	Coaxial chuck, non-thermal, 300 mm (12")		●	●

Thermal Chucks**

Part Number	General Description	Chuck Compatibility		
		CM300xi-F	CM300xi-S	CM300-O*
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: X = 1 (Nickel), X = 2 (Gold)

* For CM300-O: Thermal chucks can be used for above ambient temperatures only.

** Thermal chucks requires thermal systems to control chuck temperature.

Thermal Systems

Part Number	General Description	Compatibility		
		CM300xi-F	CM300xi-S	CM300-O
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 (200-230 VAC 50/60 Hz), CDA-saving, requires CDA dew point <-70°C	●	●	
TS-426-08R	Thermal System, -40°C to 300°C, ATT (200-220 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.

> System Features

General Probe System Specifications

Usability feature:

- ContactView (East-West orientation)

Automation features:

- Option off-axis PTPA
- Automated Thermal Management (ATM)

Top shielding:

- TopHat (for shielded configurations only)
- TopChambers (optional, for shielded configurations only)
- Probe card holder for use with 4.5" probe cards (with cover for shielded configurations)

Note: All performance metrics identified in this document are valid only when the system is installed and operated within the terms specified in the Facilities Preparation Guide.



CM300xi fully-automated system with material handling unit MHU301.



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

> MHU Features

Material handling unit

The footprint-optimized MHU301 or the powerful 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 FOUF/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 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.

Note: 200 mm wafers require a dedicated open cassette adapter to fit to the 300 mm load port.

> 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

Part Number	General Description	Chuck Compatibility		
		CM300xi-F	CM300xi-S	CM300-O
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*

Part Number	General Description	Chuck Compatibility		
		CM300xi-F	CM300xi-S	CM300-O**
TC-426-33x	FemtoGuard triaxial chuck, thermal, -60°C to +300°C (ATT), 300 mm (12"), with HT lift pins	●	●	
TC-426-32x	FemtoGuard triaxial chuck, thermal, -60°C to +200°C (ATT), 300 mm (12"), with lift pins	●	●	
TC-426-13x	Coaxial chuck, thermal, -60°C to +300°C (ATT), 300 mm (12"), with HT lift pins		●	●
TC-426-12x	Coaxial chuck, thermal, -60°C to +200°C (ATT), 300 mm (12"), with lift pins		●	●

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

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

Thermal Systems

Part Number	General Description	Compatibility		
		CM300xi-F	CM300xi-S	CM300-O**
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	●	●	

* The upper temperature limit is defined by the chuck.

** For CM300-O: Thermal Chucks can only be used for temperatures above ambient temperature.

> Available options

Automation with MHU301

MHU301-L/R	Material handling unit with one load port for 300 mm FOUF/FOSB cassettes, for CM300xi at left (-L) or right (-R) side
180-402	Open Cassette Adapter for 200mm Wafer Cassettes
182-825	ID reading for MHU301 for front side of the wafer
183-038	ID reading for MHU301 for back side of the wafer
182-826	ID reading for MHU301 Top and Bottom
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 FOUF/FOSB cassettes, for CM300xi at left (-L) or right (-R) side
MHU300-2	Material handling unit with one load port for 300 mm FOUF/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	ID reader station for codes on the surface and back side of wafers
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)
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Fully-automated system

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

> 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.
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> 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

* See FormFactor's Terms and Conditions of Sale for more details.

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CM300xi-DS-1220

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