

Cascade

# CM300xi ULN

300 mm Semi-/ Fully-automated Probe System for Ultra Low Noise Measurements

000111100010

## Overview

FormFactor's new CM300xi-ULN (Ultra Low Noise) is a revolutionary 300 mm wafer probing system designed for highly accurate flicker noise (1/f), random telegraph signal noise (RTN or RTS), and phase noise measurements of ultra-sensitive devices.

With the newly patented PureLine™ 3 technology, the ULN probing system eliminates 97% of the environmental noise experienced in previous probe systems, and establishes a new industry gold standard for ultra-low noise measurements.

When integrated with noise test equipment (flicker noise, RTN, phase noise), the CM300xi-ULN offers the industry's highest test throughput, using Contact Intelligence™ with motorized probe positioners, enabling fully Autonomous DC and low frequency noise probing with multi-DUT layouts for complete hands-free 24/7 operation.

Finally, the CM300xi-ULN takes the complexity out of low noise TestCell optimization. Just plug it in and go. Low-noise Site Survey and System Verifications significantly reduce setup costs and tool deployment time. This allows lab engineers to focus on getting good device data, that can be used to reduce the number of costly re-designs and accelerate time to market with lower development costs.



## Industry-Firsts



### PureLine™ 3 Technology

- First automated probe station to achieve **-190dB** spectral noise



### Plug In and Go

- Integrated **TestCell Power Management** provides fully managed and filtered AC power to the entire system, prober and instruments



### Autonomous 24/7 Operation

- Up to **4x** faster flicker noise thermal testing on **30 µm** pads



### Reduce Setup Time and Costs

- Exclusive low noise **site survey**, and **system verification** services

## System Noise Performance

Spectral Noise Floor			ULN On-Site Verification
Low band	1Hz – 1kHz	-120@1Hz, -140@10Hz, -160@100Hz (dBVrms/rtHz)*	●
Wide band	1kHz – 1MHz	≤-190 dBVrms/rtHz**	
Extended wide band	1kHz – 20MHz	≤-180 dBVrms/rtHz*	●
AC Noise			
Chuck noise	≤ 3 mVp-p (≤ 2.5 GHz)***		●

NOTE: All system noise performance results use test setup with triaxial thermal chuck, 50 Ω termination, multi-band high-quality LNAs, VSA or DSO instruments, with MicroChamber closed, station power ON, and thermal system ON. L-LNA (P/N 191-201), and H-LNA (P/N 191-101).

\* ULN System Specification verified on-site during system installation using DSO instrument and L-LNA/H-LNA.

\*\* Typical results using VSA and H-LNA instrument setup.

\*\*\* ULN System Specification verified on-site during system installation. Instrument setup: digital oscilloscope (DC to 2.5 GHz), 50 Ω input impedance, cable to chuck Triax connector using Triax to BNC (Guard-Shield Short) adapter. Measurement: Peak-Detect mode, Peak-Peak Noise Voltage (acquire 10sec data 64 times, calculate mean of Vp-p + Stdev of Vp-p)."

## System Electrical Performance

Probe		CM300xi-ULN FemtoGuard (thermal)	CM300xi-ULN FemtoGuard (non-thermal)
Leakage*	Thermal Controller OFF	≤ 1 fA	≤ 1 fA
	Thermal Controller ON	≤ 5 fA	N/A
Wafer Chuck			
Chuck leakage* (ATT)	Thermal Controller OFF	≤ 3 fA	N/A
	-55°C	≤ 6 fA	N/A
	-40°C	≤ 6 fA	N/A
	25°C	≤ 3 fA	N/A
	200°C	≤ 3 fA	N/A
	300°C	≤ 6 fA	N/A
Residual capacitance**		≤ 2.5 pF	≤ 2.5 pF
Capacitance variation**		≤ 2 fF	≤ 2 fF
Settling time***	All temperatures @ 10 V	≤ 50 fA @ 0.5 sec	≤ 50 fA @ 0.5 sec

\* 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.

**Electrical**

Integrated technologies	AttoGuard and PureLine (Generation 3)
EMI shielding	> 30 dB (typical) @ 1 kHz to 1 MHz

**Light Shielding**

Type	Complete dark enclosure around chuck
Wafer access	Front access door with rollout stage for easy manual wafer loading Side access door for fully automatic wafer loading
Probe compatibility	Standard MicroChamber TopHat™ allows access for up 8 probes Additional TopHat™ versions are available for special DC / RF probe configurations
Light attenuation	≥ 130 dB

**Air Purge and Condensation Control**

Test environment	Low volume CDA for fast purge, external probe positioning and cable access to maintain sealed environment
Dew point capability	> -65° C for frost-free measurements*
Purge gas	Clean dry air (CDA)
Nominal purge flow rate – Maintenance	80 liters/min (2.8 SCFM)
Nominal purge flow rate – Quick purge conditioning	240 liters/min (8.5 SCFM)
External condensation control	Integrated laminar-flow air distribution on external MicroChamber surfaces to eliminate condensation

\*See CM300xi-ULN Facility Planning Guide for details.

> Mechanical Performance

**X-Y Stage**

**Semi-/Fully-automated**

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
Manual XY knobs	Ergonomic manual XY controls for easy manual moves and precision placement

\* The Manual XY Controls are included with the optional 3D Manual Controls.

**Z Stage**

**Semi-/Fully-automated**

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)

## ➤ Mechanical Performance (continued)

<b>Theta Stage</b>	<b>Semi-/Fully-automated</b>
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

## ➤ Platen System

<b>Platen</b>	
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

<b>Virtual Platen Lift*</b>	
Type	Virtual feature inducing synchronised movement of chuck and microscope stage
Range	3.0 mm (0.12 in.)
Repeatability	≤ 3 µm (0.12 mils)
Lift control	Ergonomic handle with 80° stroke.

\* The Platen Lift is included with the optional 3D Manual Controls.

<b>Platen Insert</b>	
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
HTS thermal management	Integrated laminar-flow air-cooling for thermal expansion control

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

<b>Probe Card Holder*</b>	
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.

## > Platform (continued)

### Software

---

The CM300xi-ULN 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-ULN 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

---

## > FemtoGuard® Chuck Performance

Electrical		Thermal Chuck					Non-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	≥ 500 V
	Guard-to-Shield	≥ 500 V	≥ 500 V	≥ 500 V	≥ 500 V	≥ 500 V	≥ 500 V
	Force -to-Shield	≥ 500 V	≥ 500 V	≥ 500 V	≥ 500 V	≥ 500 V	≥ 500 V
Resistance***	Force -to-Guard	≥ 5 x 10 <sup>12</sup> Ω	≥ 5 x 10 <sup>12</sup> Ω	≥ 5 x 10 <sup>12</sup> Ω	≥ 5 x 10 <sup>11</sup> Ω	≥ 1 x 10 <sup>11</sup> Ω	≥ 5 x 10 <sup>12</sup> Ω
	Guard-to-Shield	≥ 5 x 10 <sup>11</sup> Ω	≥ 5 x 10 <sup>11</sup> Ω	≥ 5 x 10 <sup>11</sup> Ω	≥ 5 x 10 <sup>10</sup> Ω	≥ 1 x 10 <sup>10</sup> Ω	≥ 1 x 10 <sup>12</sup> Ω
	Force -to-Shield	≥ 5 x 10 <sup>12</sup> Ω	≥ 5 x 10 <sup>12</sup> Ω	≥ 5 x 10 <sup>12</sup> Ω	≥ 5 x 10 <sup>11</sup> Ω	≥ 1 x 10 <sup>11</sup> Ω	≥ 5 x 10 <sup>12</sup> Ω
Capacitance****	Force -to-Guard	≤ 1100 pF	≤ 1100 pF	≤ 1100 pF	≤ 1100 pF	≤ 1200 pF	≤ 800 pF
	Guard-to-Shield	≤ 5000 pF	≤ 5000 pF	≤ 5000 pF	≤ 5000 pF	≤ 5000 pF	≤ 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.

## > Thermal System Performance

### Thermal System Overview

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 <sup>1,2</sup>	± 2.5°C at 100°C	

- 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).
- 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 <sup>1,2</sup>	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)\*

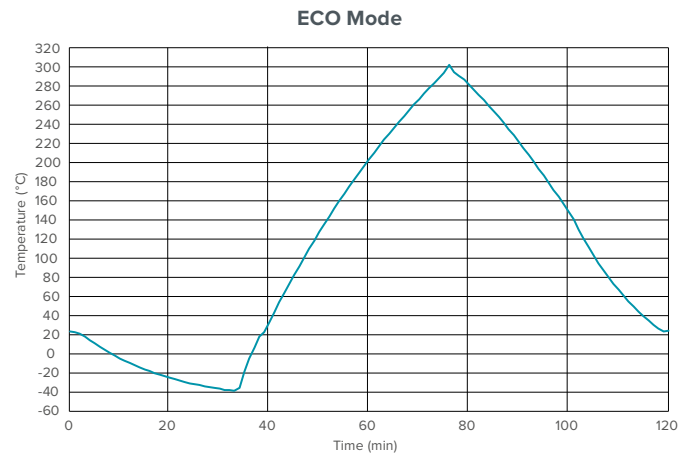
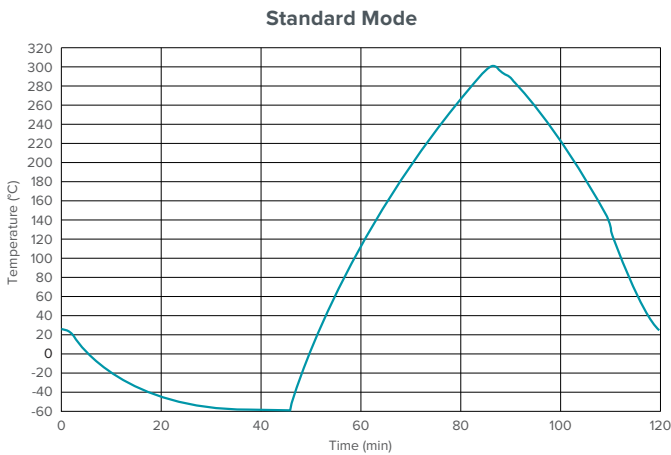
		Standard Mode	ECO Mode
Cooling	25°C to -40°C	17 min	34 min
	25°C to -60°C	53 min	N/A
	200°C to 25°C	18 min	27 min
	300°C to 25°C	33 min	44 min
Heating	-60°C to 25°C	7 min	N/A
	-40°C to 25°C	5 min	5 min
	25°C to 200°C	19 min	19 min
	25°C to 300°C	35 min	35 min

\* 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-ULN 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 <sup>1, 2</sup>	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

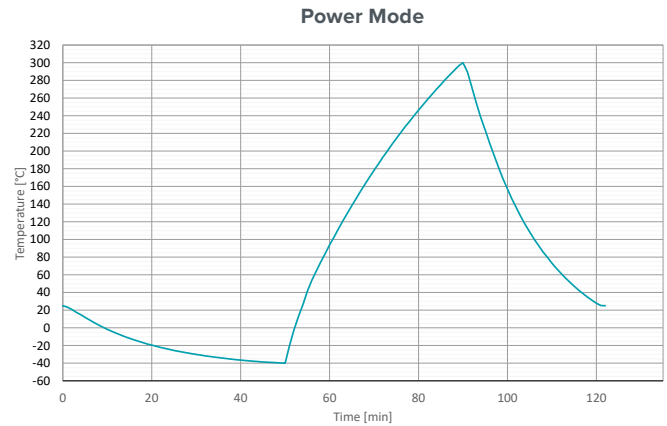
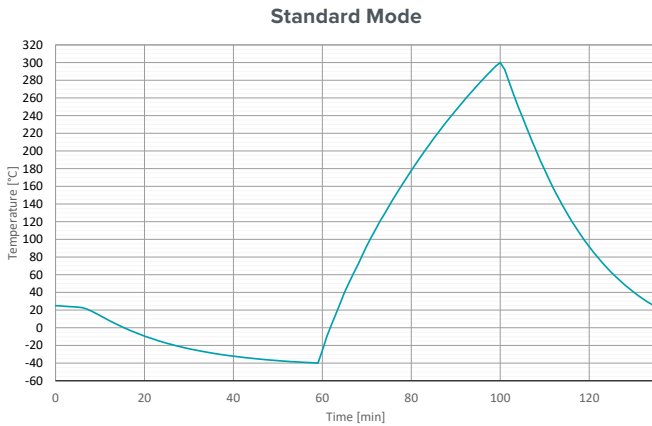
\* Performance valid within fulfilled facility media requirements as stated in the Facility Planning Guide.

\*\* 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-ULN 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 <sup>1,2</sup>	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.

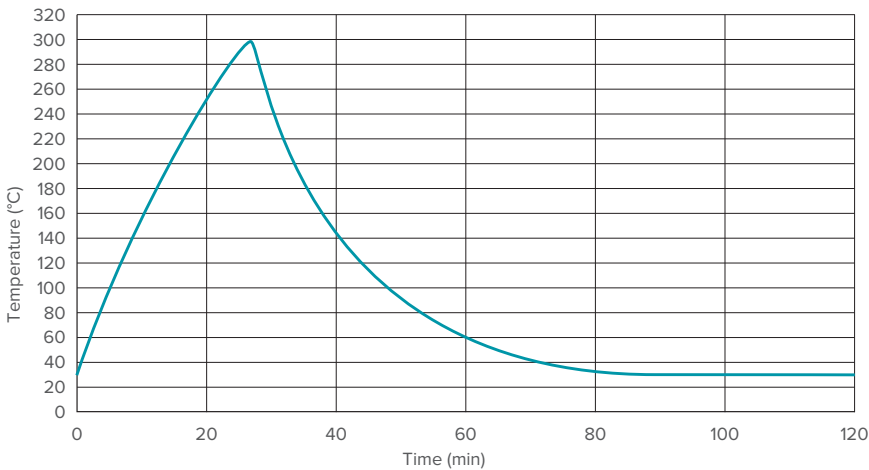
### ATT Transition Time (Typical)\*

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-ULN 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 $\mu\text{m}$ (0.04 mils)
Resolution, Z axis	0.4 $\mu\text{m}$ (0.016 mils)
Repeatability, X-Y axis	$\leq 2 \mu\text{m}$ (0.08 mils)
Repeatability, Z axis	$\leq 1 \mu\text{m}$ (0.04 mils)

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)

#### 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	≤ 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

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	≤ ± 10 μm (0.39 mils)
Thermal isolation	Air gap, > 10 mm
Positional repeatability	2 μm (0.08 mils) after rollout event
Vacuum actuation	Independent manual control

## Configuration

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

Configuration includes:

Contact Intelligence™ Technology

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

AttoGuard® technology for accurate IV/CV measurements

PureLine™ Gen3 Technology for Ultra Low Noise measurements

VueTrack™ on-site probe-to-pad alignment technology\*

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

\* Standard VueTrack aligns the wafer chuck to the probes. For alignment of motorized positioners, order VueTrack Pro.

### Options

Note: To complete the CM300xi-ULN 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)

### Modular Chucks

Part Number	General Description	Chuck Compatibility
		CM300xi-ULN
TC-006-30x	FemtoGuard triaxial chuck, non-thermal, 300 mm (12")	●
TC-426-30x	FemtoGuard triaxial chuck, thermal*, -60°C to 300°C (ATT), 300 mm (12")	●

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

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

### General Options

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

## › Configuration (continued)

Thermal Systems		Compatibility
Part Number	General Description	CM300xi-ULN
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)
- TopHat (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-ULN fully-automated system with material handling unit MHU301.

## > MHU Features

Material handling unit	The footprint-optimized MHU301 can be configured to provide fully automated testing. It offers 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. 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.
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-ULN probe system with no integrated wafer loader



### Fully-Automated

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



*Notes: For detailed facility requirements, refer to the CM300xi-ULN Facility Planning Guide.*

## > 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-ULN
TC-006-32x	FemtoGuard triaxial chuck, non-thermal, 300 mm (12"), with lift pins	●
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	●

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.

## > Available options

### Automation with MHU301

MHU301-L/R	Material handling unit with one load port for 300 mm FOUP/FOSB cassettes, for CM300xi-ULN 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-ULN fully-automated system with material handling unit MHU301.

## > 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)
--	---

---

## > 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
-------------------	--

---

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

© Copyright 2020 FormFactor, Inc. All rights reserved.  
FormFactor and the FormFactor logo are trademarks of  
FormFactor, Inc. All other trademarks are the property of  
their respective owners.

All information is subject to change without notice.

### Corporate Headquarters

7005 Southfront Road  
Livermore, CA 94551  
Phone: 925-290-4000  
[www.formfactor.com](http://www.formfactor.com)

CM300xi-ULN-DS-1220