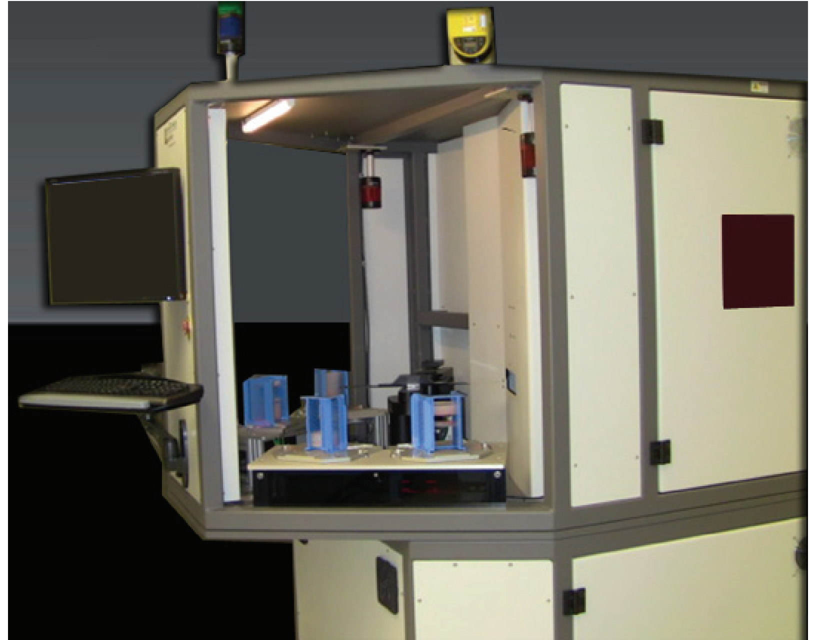
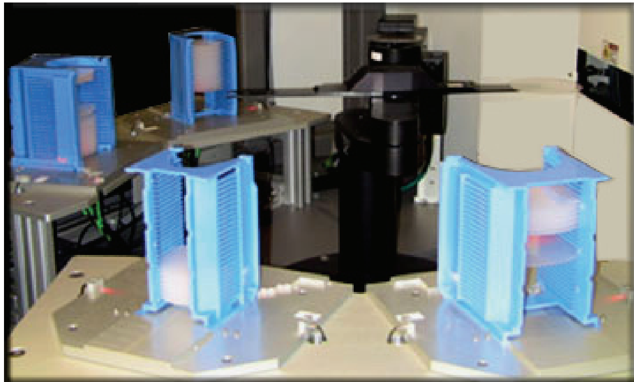
Wafer & Die Serialization

At *Control Micro Systems* we combine our years of experience with a variety of disciplines to provide a turn key solution: integrating state of the art laser applications with process automation and system validation. By utilizing the wide range of lasers and imaging optics developed by *Control Micro Systems* we frequently provide our customers with exceptional processing performance and we never lose sight of the ultimate goal of your interest in laser technology… improved productivity and lower costs. As such with wafer processing; serialization for traceability, scribing and lapping wafers we offer a range of solutions tailored for your specific requirements. When determining the system offerings we take into account that it must meet many processing requirements such as geometries, dimensions, line width, slag tolerances, and clean room protocol. In addition substrates: silicon, sapphire, compounds (GaAS, InP, $SiCO_2$, SiGe etc.), crystal wafers ($LiTaO_3$ and $LiNbO_3$.) or ***photo resist exposing*** of course handling needs and throughput must be considered when offering the best solution for your needs.



See video at www.waferserialization.com



Some examples of the systems offered and their benefits include:

- The *UV System (355nm or 266nm)* offers the best solution when process tolerances are the most important deciding factor. This system allows geometries and line widths below 5 micron in dimensions and processing with minimal to no slag. This system also reduces particulate generation such that it is acceptable for today's most stringent clean room protocol.

◄ *Example of four cassette system for processing 2" - 8" wafers*

- The *532 UV System* offers a solution including reduced line width in regards to the above offerings; in the 15 micron range. In addition, the *532 System* offers deeper etch capabilities at a lower power in regards to the *355 UV System.*

- The *Fiber Systems* provide solutions where tighter tolerances are required. These systems also produce less particulate than the *CO_2 Laser System* and thus are acceptable for standard fabrication clean room in the Class 100 range. These systems also can provide deeper scribe lines at a lower power than the *532 System* and *355 System* described above should scribing and lapping be desired.

- The *CO_2 Laser System* offers an economical solution suitable for serialization and dicing for use in higher class clean room, when larger geometries and line widths are acceptable and slag is not a major concern. A benefit for the *CO_2 System* is that it will allow for a deeper scribe line with a single laser pass in relation to the other system offerings.

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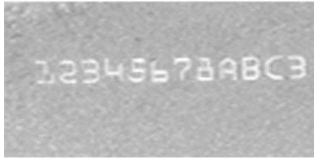
CMS Wafer Marking System Specifications



Sapphire wafer marks from CMS' Applications Development Laboratory

System
- 4 stations, 2 loaded, 2 unloaded
- Wafer Sizes: 50 mm, 75 mm, 100 mm, 125 mm, 150 mm, 200mm, 300mm
- Wafer thickness: 300 micron to 800 micron
- Flat or Notch Alignment
- Dual end effector robot for wafer movement
- Standard Vector marking of SEMI M12 characters, SEMI T5-96, SEMI OCR characters, 2D and 1D barcodes
- Debris Free Dot Font
- Windows Control Package with WaferMark Software

Note: other configurations available at customer request including but not limited manual loading, XY tables, FOUP loading

Reader
- High resolution OCR reader
- Optional OCV, 2D, or 1D barcodes
- Multi camera option available

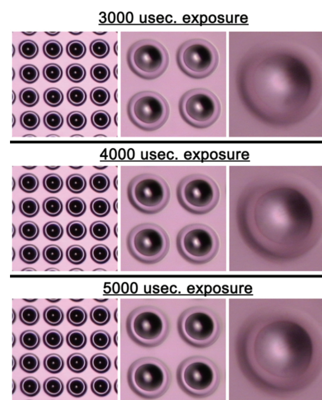
Positioning
- System repeatability for marking is +/- 100 microns in X/Y 0.2 degree theta; Standard system with pre-aligner and semiconductor robot.
- *(Overall system positioning and repeatability are a function of the complete handling system including pre-aligner, robot, vacuum chuck, table system, fiducials and vision system; note not all components are included with all CMS Systems; Selection of components will dependent on CMS's determination of customers' exact needs)*. ***Systems including fiducials and vision system offer better than +/- 5micron repeatability***

Laser Types
- Frequency Quadrupled 266nm
- Frequency Tripled 355 nm
- Frequency Doubled 532 nm
- Yttrium Fiber 1064 nm

Note: laser type will depend on wafer material and marking requirements.

Compliance
- CDRH Class I
- CE/UL/CSA available on request

Facility Requirements
- Power: 220 VAC , 1 phase, 30 amps, 50/60 Hz (other voltages available on request)
- Exhaust: Internal Smoke Evacuation or customer supplied plant ventilation
- Air: 80 to 100 psi at 5 SCFM, clean and dry
- Vacuum: 0.2CFM at -5.8 psi.
- Operating Temperature/Humidity: This system is designed to operate in a clean room within a temperature range of +/- 2^0F between 65^0 to 80^0F with less than 50% humidity, non condensing



Magnified silicon wafer marks from CMS' Applications Development Laboratory. Magnified marks display relationship between time of laser beam exposure with the silicon.

Substrates
- Si, GaAs, SiGE, InP, $LiTaO_3$, Sapphire, Glass
- Exposure of Photoresist

Dimensions
- 70" deep x 56 inches wide x 74" high (300mm wafer will affect dimensions)

Mark
- Semi T5-96, Semi 12, Semi OCR; Required Characters of 1.624mm x 0.812mm +/- 0.025mm; width 0.2mm +0.05mm/ -0.150mm. Smaller characters achievable.
- Depth 1.0-1.5µm; deeper marks achievable
- Plough 0.05 µm
- Die serialization + x-out capabilities

Mark Location
- Within the exclusion zone
- Die marking across the wafer as programmed

Note: mark characteristics such as line width, depth, plough and debris will be affected by many factors including substrates, laser selected, system configuration and class of clean room. Samples should be submitted to Control Micro Systems Applications Lab for testing with your exact requirements.