

in cooperation with **set**  
Smart Equipment Technology

# XBC300 Gen2 D2W

Growing Innovation



# A gamechanger in enabling further interconnect scaling

The XBC300 Gen2 D2W platform offers high process stability for sequential die to wafer (D2W) hybrid bonding at a cleanliness level matching front-end-of-line (FEOL) requirements. Replacing traditional solder based micro-bump interconnects with hybrid bonding is considered a game changer enabling further interconnect scaling.

Compared to W2W hybrid bonding the D2W process flow comes with specific challenges, which need to be addressed from an equipment as well as a process perspective. Besides the process control for the actual flip-chip bonding step, this includes surface cleaning/activation and finally a dedicated overlay metrology solution specifically adapted for single die qualification. For this application SUSS leverages its leading position in wet processing and precision alignment and has partnered with SET (Smart Equipment Technology), a leading flip-chip bonder manufacturer, in order to offer a seamless integrated D2W solution to worldwide production and R&D customers.

Smallest footprint on the market for fully integrated die-bonding

For high yield D2W processing

State-of-the-art chip die bonder with <30µm die spacing

We are committed to driving the next chapter of innovation and growth in the advanced backend together.

# XBC300 Gen2 D2W

## Highlights

- Fully automated wafer bonder for D2W bonding on 200 mm and 300 mm wafers and wafers on tapeframe
- Optional patented die-on-droplet placement (DOD) for better bond interface defectivity control
- Optional defect inspection to identify critical particles at die placement sites
- High accuracy D2W placement performance ensuring +/- 200 nm post placement accuracy
- Integrated metrology option (overlay measurement, void detection) allowing for multipoint measurement at highest accuracy



# Process modules for flexible configuration possibilities

## Die Bonder

The NEO HB from SET Corporation SA is a state-of-the-art flip-chip die bonding platform covering a wide range of die geometries. Industry-leading cleanliness and alignment performance ensure high-yielding D2W transfer operation at high speed. Extremely low inter-die-spacing ( $<30\mu\text{m}$ ) allows for high die densities on target substrates when needed. SUSS MicroTec and SET work hand in hand to optimize system performance and provide customers with a flexible system solution to meet future needs. Droplet dispense functionality available on request.

## Aqueous cleaner modules

Aqueous cleaner modules for full wafers and tape-frames offer various dispense system options including megasonic. The modules also allow for optional backside rinse and N<sub>2</sub>-assisted spindrying. Diluted cleaning chemistry such as  $<2\%$  NH<sub>4</sub>OH or citric acid is possible in the basic configuration. Organic removal functionality using SC1 is available on request.

## UV exposure unit

A release UV exposure is required to support die pick-up from adhesive tapes particularly for very thin dies.

## Surface activation

The PL300 offers highest process flexibility and repeatability for plasmabased wafer surface activation. Various process gases such as Ar, O<sub>2</sub>, N<sub>2</sub> etc. can be used and are controlled via mass flow controllers (MFCs). The gate-valve loading PL300 allows for full CMOS compatibility and can also be used for plasma cleaning of polymer residues. The vacuum plasma chamber is designed for both target wafer and tape-frame processing.

## Metrology station

Integrated in-situ metrology functionality allows for fast process feedback. Overlay verification is key for increased process control and yield improvement. The metrology module offers full-field IR void inspection and/or IR overlay measurement featuring multi-site capability at maximized throughput. Industry-leading precision and accuracy combined with closed-loop feedback enables optimized bonding performances.

## Material handling unit

The highly modular XBC300 Gen2 D2W platform can be equipped with up to four I/Os (for wafers and tape-frames) and up to nine process modules. A high-precision and high-throughput 6-axis robot handles single wafers and bonded wafer stacks. All handling activities inside the machine are monitored via a fully customizable camera configuration.



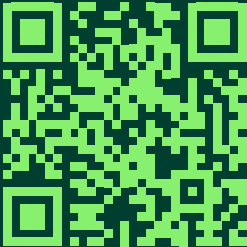
# XBC300 Gen2 D2W

## Technical data

General	
Substrate Size	200 / 300 mm wafers + 400 mm tape-frames
Dimensions (WxDxH)	3120 mm x 4400 mm x 2790 mm
Load Port	2 x fully automatic FOUP load ports and cassette adapter options 2 x tape-frame cassette stations
Wafer Handling System	6-axis robot with integrated wafer flipping, special handlers (e.g. for warped wafers) on request
Tape-Release	UV flood exposure for die release on UV sensitive tapes
Pre-aligner and ID readers	Camera-based pre-aligner and optional wafer ID Reader
User Interface	Microsoft Windows 10 based operating system with SUSS MMC software
Substrate Processing	Fully programmable cluster tool with factory automation options Drag and drop sequence editor with cyclic scheduler and automated throughput optimization
Options	SECS/GEM and different data logging/analyzing tools are available Filter fan units Ionizer bars Defect Inspection (DI) for particle detection
PL300 - Plasma Module	
General	Vacuum plasma chamber for effective wafer surface activation for high-bond strength fusion bonding Ambient plasma surface activation at atmospheric pressure can be offered optionally
SET NEO HB Die-bonder	
Die-handling	Flip-chip (standard feature) Die-attach functionality (optional)
Substrate Sizes (Target Wafer)	200 and 300 mm wafers

Tape-Release	UV flood exposure for die release on UV sensitive tapes
Die Feeding Unit	Waffle trays, 200 mm & 300 mm wafers, 400 mm Tape-Frame
Maximum Die Size	22 x 22 mm <sup>2</sup>
Minimum Die Size	1 x 1 mm <sup>2</sup>
Min. Die Thickness	Down to 30 µm
Bond Force	Up to 300 N
Alignment Accuracy	< +/- 200 nm post bond
Options	DOD - Dorplet on die functionality
AC300 - Aqueous Cleaner	
General	Single wafer cleaner with puddle and megasonic DIW rinsing Allows for diluted chemistry operation
Options	Back-side rinse N2-assisted spin-dry SC1 chemistry compatibility Citric acid
MM300 - Metrology Module	
General	Throughput- and footprint-optimized metrology station for high-accuracy overlay measurement and optional void detection Field-upgradable
Options	Overlay inspection, and void detection
IR Overlay Measurement	Reflective or transmissive mode
IR Void Detection	> 500 µm, automatic classification
Closed-loop	Enables automated offset-correction of bonding parameters
Measurement Flexibility	No restriction on location or amount of measurement sites on wafer

Data, design and specification depend on individual process conditions and can vary according to equipment configurations. Not all specifications may be valid simultaneously. Illustrations, photos and specifications in this brochure are not legally binding.  
SUSS reserves the right to change machine specifications without prior notice.



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