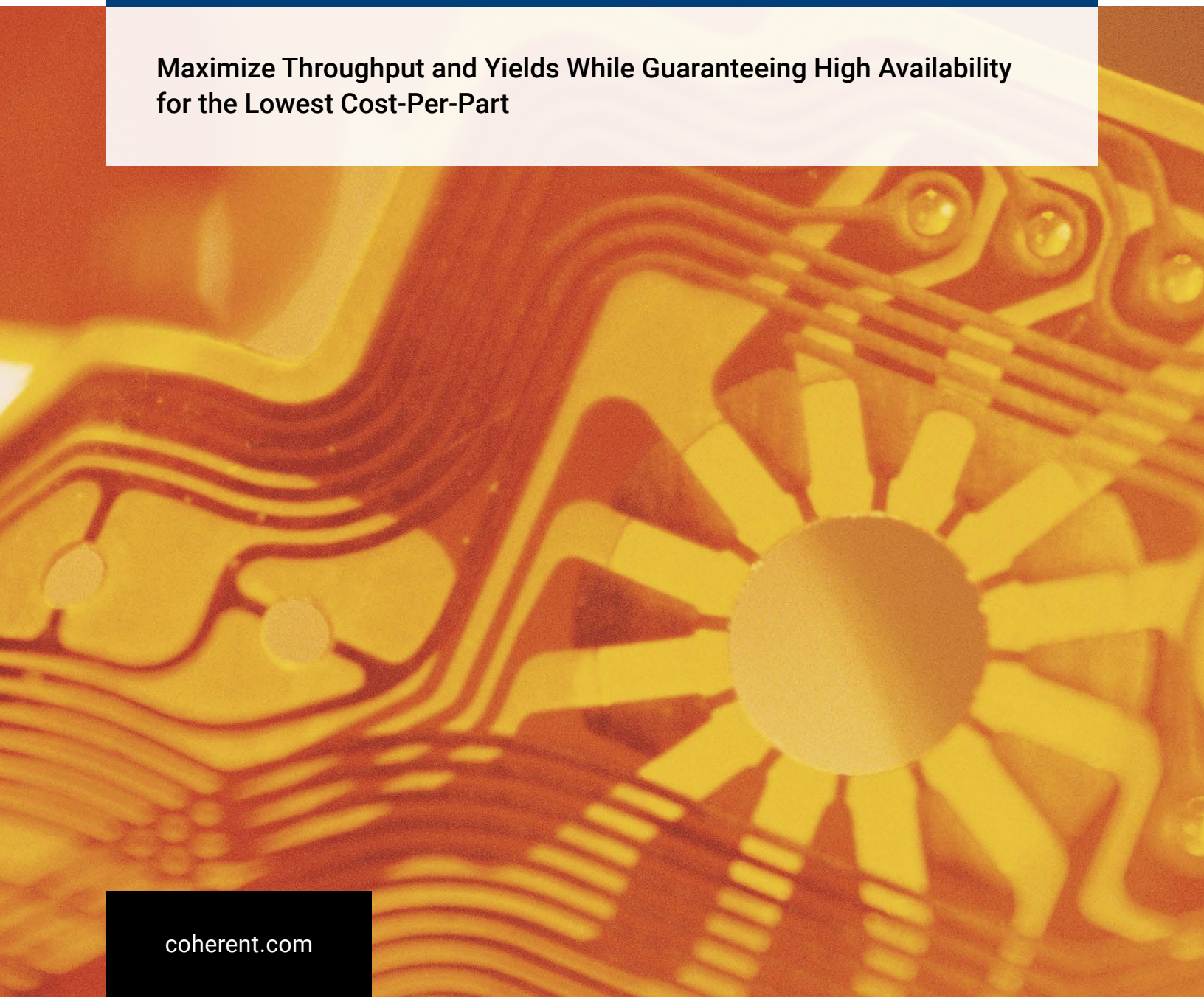
COHERENT

Advanced Packaging and Interconnects

Maximize Throughput and Yields While Guaranteeing High Availability for the Lowest Cost-Per-Part



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Laser Solutions for **Advanced Packaging and Interconnects**

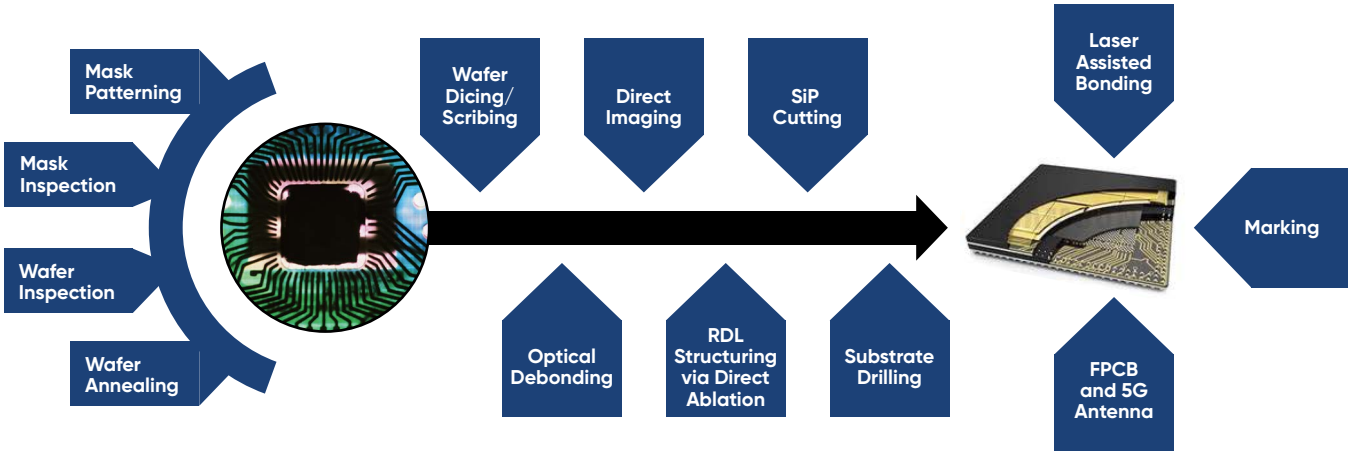
Coherent offers an unparalleled product portfolio that addresses any laser-based application in semiconductor fab, packaging, and electronic assembly.

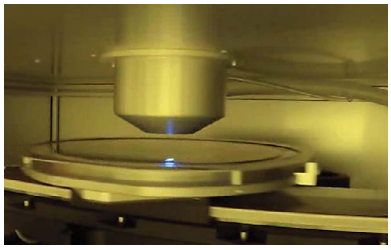
Demand for lasers in inspection, materials processing, and marking throughout microelectronics production continues to grow. This is because lasers enable high-speed, non-contact processing on virtually any material, and create features down to micron scale with unrivaled mechanical precision and minimal heat affected zone.

As microelectronics manufacturers are pressed to increase precision, reduce costs, and utilize more exotic material compounds, the need to optimize production methods becomes ever more critical. Picking exactly the right laser for a specific task, configuring the system, and determining the ideal process parameters in this challenging environment requires specialized expertise and knowledge.

For this reason, choosing the right laser really means choosing the right laser supplier. Manufacturers need a partner who has the specific technical and applications development resources to identify the best and most cost-effective solution.

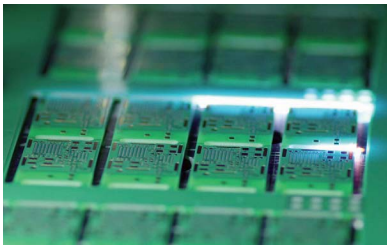
Coherent is that partner. The unparalleled breadth and depth of our product offering means that we have the right laser technology for your specific application – no matter what it is and where you are. Discover why microelectronics manufacturers throughout the world rely on Coherent products to help cut cost, improve results, and maximize uptime. Come and leverage our worldwide applications labs and unmatched product portfolio.





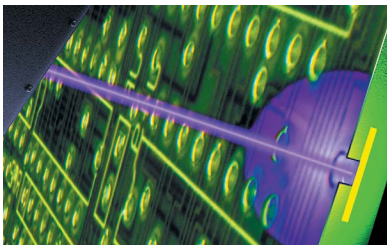
Optical Debonding

Laser debonding enables quick and reliable separation of a device wafer from a temporary carrier, without any mechanical strain, damage, or heating of the die. Coherent supplies both excimer and nanosecond green solid-state laser sources for debonding and can integrate them up to the sub-system level. These lasers deliver the high throughput, yield and reliability required for successful production debonding.



Depaneling

The increasing use of thinner boards, flex circuitry, thicker conductive layers, and low-κ dielectrics all challenge traditional mechanical depaneling methods, and even CO_2 laser-based tools. The Coherent SmartCut™ process leverages high pulse energy and advanced processing to enable depaneling at high speed, with excellent edge quality and minimal debris production. Plus, these lasers deliver narrow kerf widths and high dimensional accuracy, and can even cut multi-layer PCB boards including copper layers without melting the copper or charring the resin.

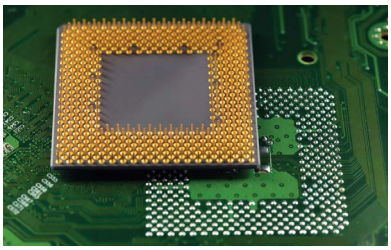


PCB and Substrate µ-via Drilling

As via diameters shrink, lasers offer an attractive solution for drilling micro-vias at very high speed. Coherent provides both high reliability CO_2 lasers as well as ultrashort pulse (USP) laser for high-speed production of 35 – 100 µm diameter vias in materials ranging from traditional copper clad PCBs to the most advanced composite structures. These sources consistently yield high hole circularity, steep sidewalls and clean copper at the bottom (for blind holes). Their ability to drill substrates with single laser pulse enhances throughput.

5G Antenna Cutting and Drilling

Micromachining of flexible 5G antenna materials represents a particular challenge because these multilayer composites contain both copper and polymers with very different melting points and ablation thresholds. Nanosecond and picosecond lasers have proven capable of cutting, drilling and scribing 5G antennas with the necessary precision, most importantly without damaging heat sensitive dielectric layers. The unique Coherent PulseEQ technology delivers cut edges, scribes and holes with no heat affected zone.



Laser Assisted Bonding

Laser assisted bonding (LAB) provides superior results to traditional reflow soldering for attaching dies in flip chip, surface mount and other advanced packaging applications. In particular, LAB allows for the very spatially selective application of heat, making it particularly valuable for designs incorporating heat sensitive components and very small geometries. Coherent LAB solutions can be configured to produce a beam shape that precisely matches the die and package size, and enable rapid processing times and precise temperature control, and also offer exceptional reliability and lifetime.

Marking

Laser marking is employed in numerous semiconductor fabrication, packaging and assembly applications. That's because laser marking is flexible, enabling the production of either high contrast marks, shallows marks for heat sensitive components, or microscopic marks as the application demands. They also readily support serialization or high-resolution Data Matrix or other 2D barcodes. Coherent delivers marking lasers, laser-based marking engines and fully automated, turnkey systems based on sources including CO_2, solid state, fiber, ultrashort pulse lasers and more.

Advanced Packaging and Interconnects

APPLICATION	Your Need	Our Solution	Your Benefit	Laser Options
Debonding	Detach temporary carrier from wafer without mechanical strain and damage to die	Sub-system or OEM laser using ns-green or UV sources	High throughput High yield High reliability	Nanosecond UV and Green Lasers
Depaneling	Cut multi-layer PCB board containing copper layers without melting the copper and charring the resin	Sophisticated coordination between ideal laser parameter and process strategy leads to maximum cutting speed without charring and melting	High cutting speed Excellent edge quality	Nanosecond UV and Green Lasers Picosecond UV, Green, and IR Lasers
PCB & Substrate Drilling	Fast drilling of 35 to 100 µm diameter holes into PCB (with copper clad) or substrate material with high hole circularity, steep sidewalls and clean copper at bottom	Industrially proven CO_2 for >50 µm and CO for <50 µm via diameters. Even smaller holes can be drilled with pico- and nanosecond lasers	Can drill through copper Capable to drill substrates with single laser pulse Clean and round blind holes	Pulsed Mid-IR Lasers Nanosecond UV Lasers Picosecond UV and Green Lasers
LCP Drilling/Cutting	Drill and cut flexible antenna materials at high speeds without damaging heat sensitive dielectric layers	Nanosecond and picosecond laser pulses to eliminate substrate heating during process	No heat affected zone Fast drilling and cutting speed Blind holes with clean copper bottom	Nanosecond UV Lasers Picosecond UV and Green Lasers
Laser Assisted Bonding	Solder die on substrates or packages on PCB without heating other sensitive components in the vicinity	Fiber-coupled diodes allow for easy power delivery Beam shape adjustable to die/package size	Reduced thermal budget; only heat solder points Faster processing time More precise temperature control Up to 30 cm^2 area	Fiber-Coupled Diodes
Marking	Mark die, substrates, packages or PCBs at high speeds and with high contrast ratio Shallow mark to guarantee components stay safe	Fully integrated sub-system manages alignment and marking process	High contrast Fast marking speed Serialization Capable of doing shallow marking Some materials allow black marking	Laser Markers Nanosecond UV, Green, and IR Lasers Pulsed Mid-IR Lasers

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