

PERFECT MARKS – SHARP CUTS

■ SEMICONDUCTOR INDUSTRY ■ LASER ■ ROFIN



High-precision
semicon applications



Marking on ceramics



Silicon marking



Singulation



Laser Solutions for the Semiconductor Industry

Take Advantage of Our Experience

Backed by over 30 years of experience in laser materials processing, ROFIN offers you the most comprehensive product line worldwide for the semiconductor industry. The portfolio ranges from laser sources to turn-key solutions for micro and marking applications such as IC and wafer marking, leadframe marking, cutting and IC decapping. At ROFIN you will find comprehensive knowledge of all aspects related to the various laser applications in semiconductor manufacturing. Working closely with our customers and partners, we have established considerable expertise in customer-specific solutions.

Worldwide Customer Service

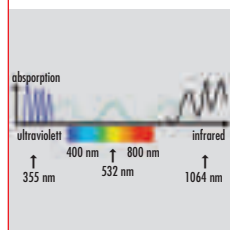
ROFIN's first-class laser systems feature the company's own laser technology designed for low maintenance and reliable operation. Whatever you require, whether beam systems or high-precision all-in-one solutions, you will find it at ROFIN. With worldwide sales and service network and experienced R&D, ROFIN has optimum, single-source solutions for manifold semicon applications.



Double head laser configuration with lateral beam exit



Marking at various wavelengths



End-pumped IC laser marker



Laser marker / double head configuration

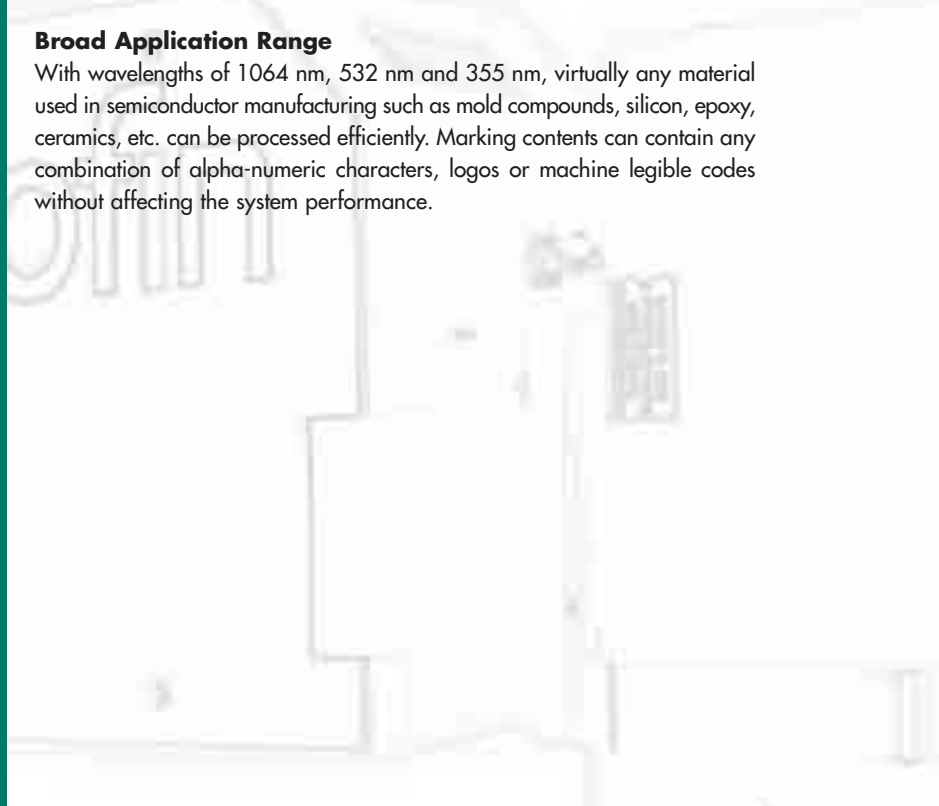
Laser Marking Systems

High Throughput

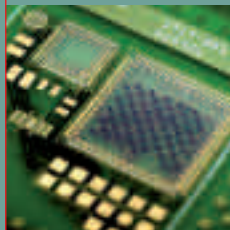
ROFIN's state-of-the-art laser marking line features our own laser technology with high-speed marking heads. Our systems have been specifically designed to serve the semiconductor industry. Speeds of up to 800 characters/second, and even up to 1100 characters/second with double head, enable rapid marking of large batch sizes. Precise beam power control and fast laser pulse repetition rates result in high-contrast marking with steadily controlled material penetration depths. Double head configurations use two marking heads attached to one laser source, sharing the laser output power. They can serve adjoining or overlapping marking fields. The marking area is large enough to cover the full length of leadframes or JEDEC trays.

Broad Application Range

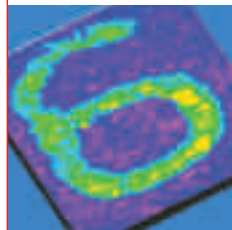
With wavelengths of 1064 nm, 532 nm and 355 nm, virtually any material used in semiconductor manufacturing such as mold compounds, silicon, epoxy, ceramics, etc. can be processed efficiently. Marking contents can contain any combination of alpha-numeric characters, logos or machine legible codes without affecting the system performance.



PCB marking



Marking at constant depth



Disc laser for cutting applications



Modular, air-cooled laser marker

Easy operation, easy integration

Powerful Software

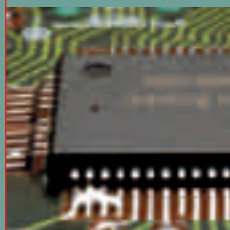
Each laser marker comes with a powerful, entirely customizable software package based on Windows XP. Text, logos or graphics can be created with drag-and-drop functions or imported from existing files. A built-in wizard provides a variety of templates and assists you in setting up your marking layout quickly. A preview function helps to check your programming at a glance.

Compact Design, Open Architecture

With compact laser heads, 19" rack supply units and numerous configuration possibilities, all laser systems are optimized for easy integration with virtually any handling configuration. Completely air-cooled lasers ensure high efficiency.

Laser marking, in combination with handler, cell or production controllers, is part of a highly integrated process. For these purposes open system architecture and flexible, customizable software are essential. ROFIN has protocols ranging from standard network protocols (TCP/IP) to SEMI standards (SECS/GEM). Visual Laser Marker functions can be controlled through ActiveX technology giving the user full control of the entire marking process.

High-speed marking on mold compounds



Leadframe marking



Wafer backside marking



End-pumped laser marker

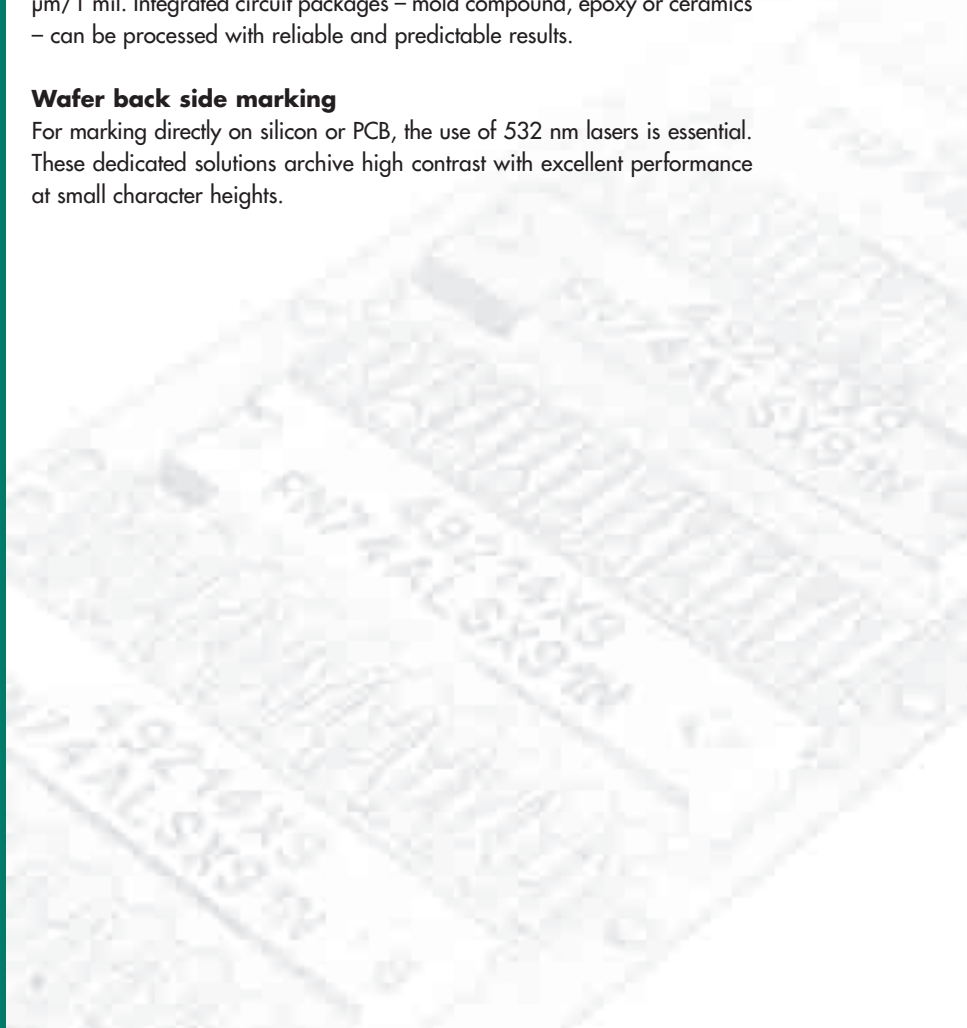
Precise results

IC Marking

ROFIN's laser markers generate characters at sizes precisely in accordance with the user's requirements. Even at a character height of 0.2 mm they still ensure best quality. Line widths are selectable from less than 40 μ to more than 160 μ , with controlled material penetration depths of less than 25 μ m/1 mil. Integrated circuit packages – mold compound, epoxy or ceramics – can be processed with reliable and predictable results.

Wafer back side marking

For marking directly on silicon or PCB, the use of 532 nm lasers is essential. These dedicated solutions archive high contrast with excellent performance at small character heights.



Marking on flat and notch area



Consistent pulse quality



Debris-free marking



Identification of wafers

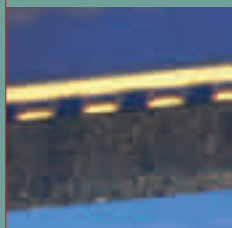
Wafer Marking

Hard and debris-free marking

The marking of silicon wafers facilitates traceability of the manufacturing process for fault analysis of semi-conductor devices. Two methods are used which differ in terms of process, depth and location of the mark. With the "hard" marking method, which produces a durable marking even after a large number of etching and polishing steps, the dots have a depth of up to 90 micrometers and are created through material ablation. Debris-free marking, which is set for clean-room environments, is just 2.5 µm deep, and is achieved solely by melting of the silicon.

Our wafer-marking products are complete turn-key solutions for the various requirements of wafer marking. The systems are based on an open cassette platform for wafer dimensions up to 300 mm. Wafers are handled by a high-accuracy robot and positioned by a high-precision pre-aligner. OCR reading is possible as an option. Full SECS/GEM capability, Semi OCRA-font, 2D matrix codes or IBM barcode 412 font are available. All wafer marking systems feature stainless steel "clean concepts" class 1 design.

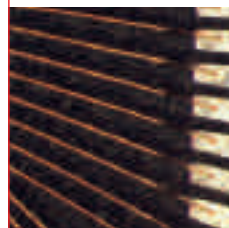
Cutting of mold compounds



Cutting of μ SD cards



Package decapping



StarDisc Laser, double head

Cutting and Decapping

Cutting

Cutting of matrix leadframes is done at high accuracy and with excellent quality. The electrical contacts are insulated before singulation, so that the packages can be tested in the leadframe. After testing, good packages are cut, the bad remaining in the leadframe. There is no reject of bad packages necessary. If required, cutting can be done without testing. On packages with a high number of leads, dambar cutting is a competitive alternative.

Decapping

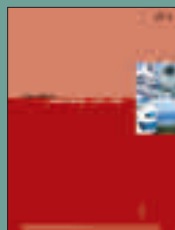
IC package failure analysis is vital in helping manufacturers to understand and address the causes of device failure. It involves unpacking the IC package by removing the black molding compounds covering the wafer die and epoxy layer. Traditional procedures like mechanical milling or chemical cauterizing suffer from severe disadvantages such as damaging the bond pads or copper traces or the leadframe itself, not to mention the hazardous chemicals required. Precisely controlled laser ablation provides a flexible technique for decapping different field sizes in various positions on the IC. Removing of the compound underneath the wiring is achieved via axes.



Medical Device Technology



Flexible Packaging



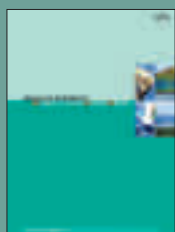
Deposit Welding



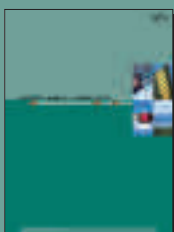
Polymer Welding



Solar Power



Jewelry



Semiconductor industry

SOLUTIONS FROM A SINGLE SOURCE

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