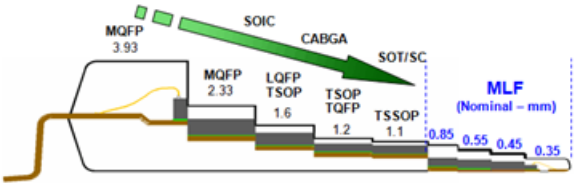
Semiconductor Packaging Trends call for Fast and Precision Controlled Laser Marking

Semiconductor packaging trends require new methods of marking and part identification. Ink dot marking is too messy, long dry times impact handler throughput and the mark is not permanent. C02 lasers have long wavelengths and lack the spot-size control required for marking small packages with clarity and depth control. Over the past 3 years, electronics manufacturers have adopted Fiber Lasers as the preferred method for marking semiconductor ICs. Fiber lasers have short wavelengths with more user control of the laser power, scan-rate and dwell time to control the spot size and mark with precision and clarity. Fiber lasers utilize solid state electronics, require no consumables and produce less particulate than C02 lasers.

Semiconductor Packages are Shrinking in Size

Semiconductor packages continue shrinking in size, both in diameter and package height. Thinner packaging presents new challenges in component identification. For years C02 laser marking has been the preferred method of marking semiconductor devices. The challenge with laser marking onto low-profile device packaging is controlling the depth of the mark to avoid damaging the internal circuitry.

Package Height Comparison



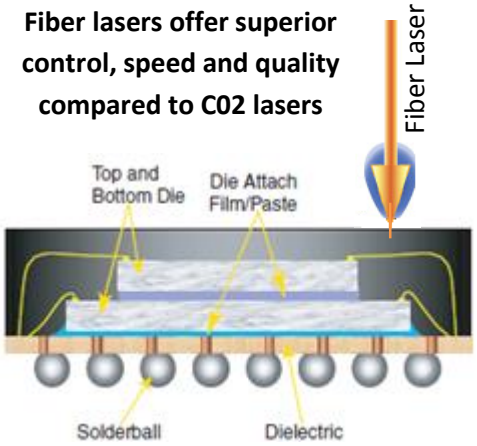
Source: Amkor Semiconductor

Laser Depth Control is Critical

Fiber Laser marking is the most flexible type of direct marking available. The ability to change various laser parameters offers the ultimate in control, quality and speed.

A key element when laser marking small parts is the spot size. The Fiber Laser spot size is about 10 percent of the diameter of a C02 laser. For example, a C02 laser often gives a spot size of .005”-.007” and the fiber laser can produce a spot size of .0005”-.001”. The small spot size gives extreme power density and exceptionally high marking resolution. The small spot size marks faster with superior depth control than a C02 laser for highest reliability and quality.

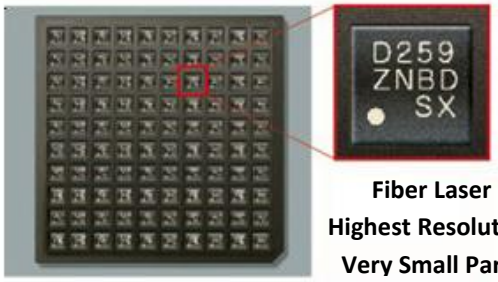
Fiber lasers offer superior control, speed and quality compared to C02 lasers



Fiber Lasers Mark with Precision Control and Clarity

Fiber Lasers provide solutions where tighter tolerances are required than CO_2 lasers can offer. These systems have processing capabilities in the 20-30 micron range for improved line width and geometry size.

Fiber laser marking allows high-speed marking on metal and plastic material increasing systems productivity. Fiber lasers are mainly used in automotive and electronics industries. Typical applications include laser labeling and part traceability.



Fiber Laser Highest Resolution Very Small Parts

Fiber lasers are solid-state devices with no moving parts, require no maintenance or alignment and require very little cooling.

Fiber Lasers are acceptable for use in Class 100 Clean Rooms

Fiber Lasers produce less particulate than the CO_2 systems, making them acceptable for standard fabrication clean rooms in the Class 100 range.

Fiber Lasers are Class 100 Clean Room Compliant

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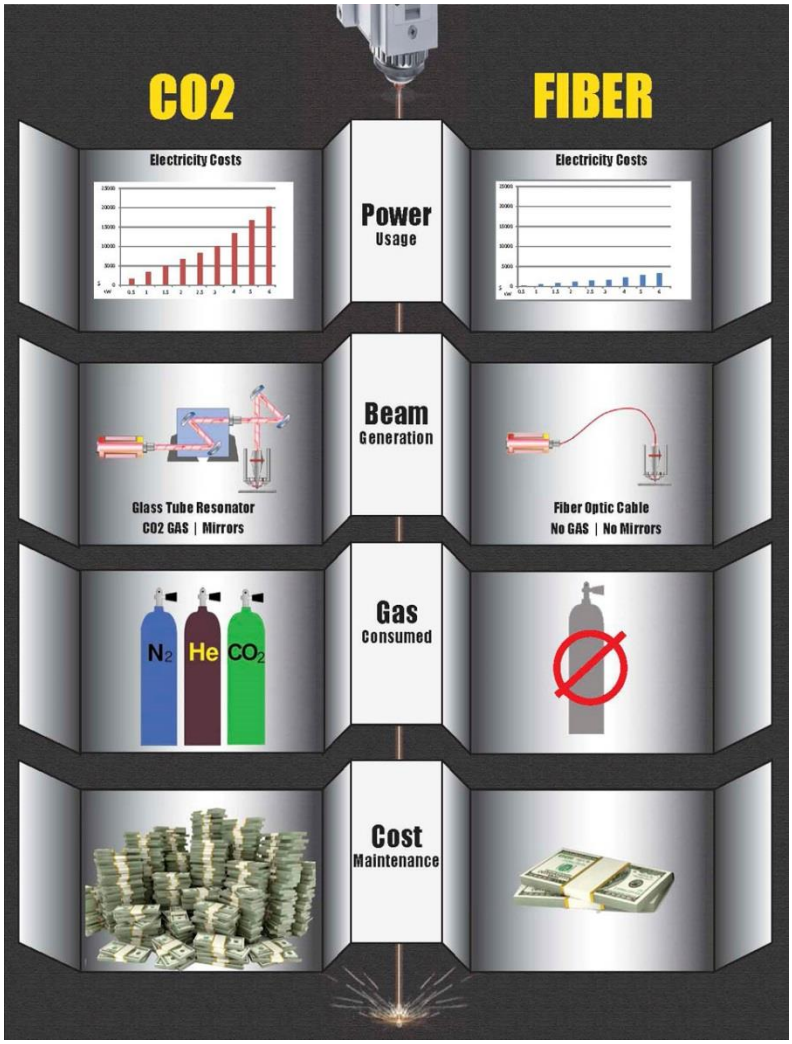
Fiber Lasers Provide: More Spot Size Control than C02 Lasers

Fiber lasers are safer and deliver a higher quality resolution than C02 lasers. The long wavelength of the C02 is not well suited for marking today's thinner semiconductors surfaces. The marking depth over which the laser energy is absorbed and the amount of material removed by a single laser pulse, depends on the material's optical properties and the laser wavelength and pulse length. The total mass ablated from the target device per laser pulse is generally referred to as the ablation rate.

- Fiber lasers have a short wavelength with much more user control over the ablation process than C02 lasers. The more control a user has of laser power, scan-rate and dwell time, the more they can control the spot size allowing users to interact with the plastics more cleanly.

Automotive and Industrial manufacturers are taking notice of an emerging technology in marking applications. Fiber laser systems which are more reliable, cost-effective and efficient than traditional technologies are now replacing CO2 lasers for marking. In the chart below Annette Plummer with JMT USA highlights some of the fiber laser advantages over C02 lasers.



Fiber Laser Advantages

Less power consumption for lower electricity costs

Solid state fiber laser with high powered beam for faster cleaner marks

No consumables and 100K + hours of expected life, vs. 500 hours for C02

No air-born particles to clog beam path, and no hydrocarbon build-up affects to the beam quality and power

Source: *Magazine Publication - Shop Floor Lasers March/April 2015 Edition*
Title: *Fiber lasers undercut the operating costs of CO2 lasers*
Author: *Annette Plummer, Marketing Manager, JMT USA*