

Explorer® Fuels Laser Marking Trends Toward Shorter Wavelengths

For over 40 years lasers have been used in a variety of marking applications. Over the years, requirements in laser based marking applications such as smaller feature size, improved contrast, efficiency improvements in production processes, and the need for customized solutions are some of the biggest challenges that equipment manufacturers have faced. Over the last decade, infrared fiber lasers became the dominant solutions due to their cost, performance, and

size advantages. However, recent application studies have shown that shorter wavelength green and UV DPSS lasers are providing performance and flexibility advantages that provide benefits for system integrators and end-users alike. Advances in compactness, weight, size and performance parameters, as well as demonstrated reliability, ruggedness and durability enabled DPSS lasers to resurface for laser marking applications.

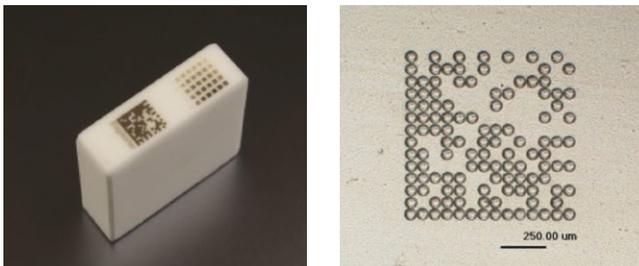


FIGURE 1.
LEFT: 2D-Dot and gray scale marking on alumina ceramic as used for medical implants. RIGHT: Marking on Peek polymer used for medical devices.



FIGURE 3.
2D-Labeling on silicon wafer with Explorer XP 532-5.



FIGURE 2.
Marks measuring $30 \times 100 \mu\text{m}$, created on a nickel surface.
LEFT: Explorer 532 nm, 10 ns pulse width. RIGHT: Typical Q-switched laser 30 ns pulse width.

Application examples that are driving the adoption of shorter wavelength lasers:

- Reduced feature sizes in 2D-matrix codes
- Medical implants relying on marking technology that avoids material debris
- Mobile device manufacturing require colored layer marking for next generation device covers
- Thin film coatings need nondestructive marking or high quality, narrow line scribing processes
- Plastic materials such as wires, tubes, and composite foils rely on shorter wavelengths for smaller feature size and improved contrast
- UV lasers enable intra-glass or glass surface marking without unwanted heat inclusions

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EXPLORER FAMILY POWERS SHORT WAVELENGTH MARKING APPLICATIONS

Miniaturization, smaller, more compact instruments and tools drive the need for Explorer lasers.

The Explorer® laser family is built on proven, dependable, and reliable DPSS architectures, and includes wavelength options at 349, 355, 532, and 1064 nm. Outstanding mode quality with typical M² values of 1.1 or less and short pulse widths as low as 4 ns bundled with high peak power enable highest quality parts marking. Explorer lasers are equipped with feature rich software capabilities intended to shorten product integration cycles when developing new marking tools or even table top instruments. E-Pulse™ is a very useful feature that provides constant pulse energy over a range of repetition rates and is a great solution when integrating the laser into both gantry and scanner based systems alike.

The Explorer product family includes the *It's in the Box™* Explorer XP 532-5, Explorer XP 355-1, Explorer One™ 355 and 349 nm compact, all-in-one lasers. Competitive products are at least seven times bigger than these

pocket-sized Explorer lasers. Explorer lasers have outstanding performance and size advantages where the ultra-compact laser head includes everything for a fast, simple, and cost efficient integration into your marking system or tool.

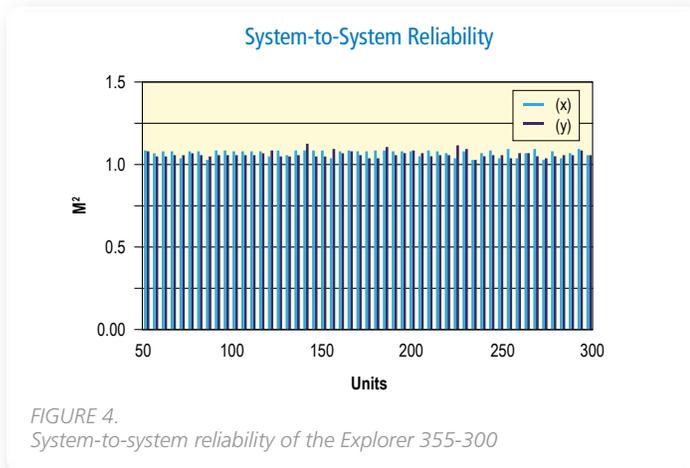


FIGURE 4. System-to-system reliability of the Explorer 355-300

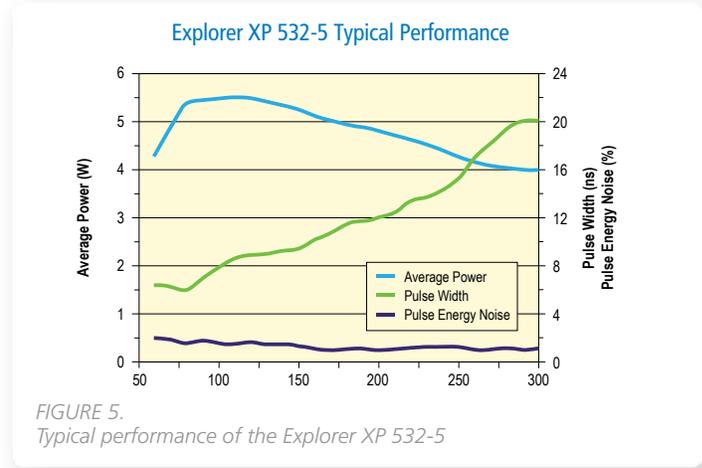


FIGURE 5. Typical performance of the Explorer XP 532-5

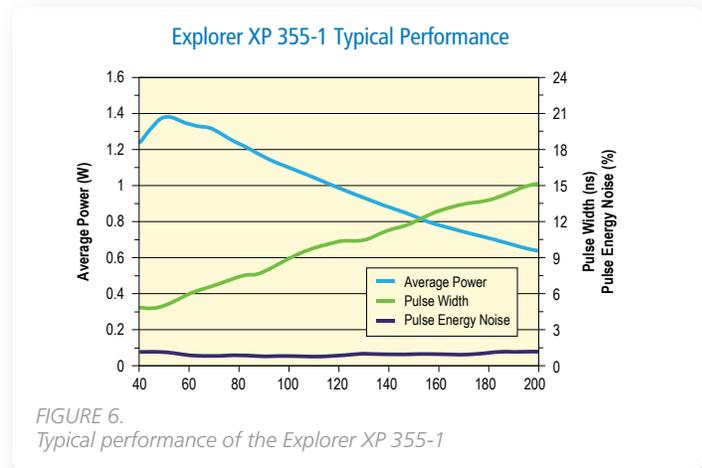


FIGURE 6. Typical performance of the Explorer XP 355-1

EXPLORER MODELS FOR MARKING APPLICATIONS

Model	Wavelength	Power/Energy	Repetition Rate
Explorer One 349-120	349 nm	>120 μJ	Single shot – 20 kHz
Explorer One 355-300	355 nm	300 mW	Single shot to 200 kHz
Explorer XP 355-1	355 nm	1 W	Single shot to 200 kHz
Explorer XP 532-5	532 nm	5 W	Single shot to 300 kHz



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