

# FEMTOFLASH

The only high-power femtosecond laser with **FULL GHz-burst modulation** for the best microprocessing results.

The precision of femtosecond pulses, combined with the highest energy and fully programmable laser modulation, delivers superior processing performance.



**LITHIUM  
LASERS** Ultra pulses,  
pure impact.



## KEY FEATURES

- **Fs pulses in GHz burst regime**
- Two models: **FEMTOFLASH 20** and **FEMTOFLASH 100** with more than 20 W / 100 W average power and 1 mJ / 10 mJ burst energy at 1030 nm
- **External SHG module** for 515 nm conversion
- **Flexible burst shaping**
- **Compact, industrial-grade design**



## APPLICATIONS

- **Through Glass Vias (TGV)**
- **Glass and polymers dicing and microprocessing**
- **Semiconductor dicing and microprocessing**
- **Through Silicon Vias (TSV)**
- **Through Carbide Vias (TCV)**
- **Microelectronics manufacturing**
- **Medical device manufacturing**
- **Micro soldering glass-glass and glass-metals**
- **Black and white marking on metals**



# FEMTOFLASH packs high-frequency ultrashort pulses into powerful bursts for faster and cleaner processing.

FEMTOFLASH combines high burst energy, adjustable energy distribution and a flexible number of pulses per burst – from 25 up to a continuous train of GHz femtosecond pulses. These unique features expand your capabilities and let you machine in a new and more efficient regime.

With FEMTOFLASH, you can precisely tailor the thermal gradient, removing material exactly where needed at unprecedented speed and accuracy, without damaging the surrounding area. Despite its performance, FEMTOFLASH has a compact, lightweight design, taking up minimal space and integrating easily into your setup.



## SPECIFICATIONS

		FEMTOFLASH 20	FEMTOFLASH 100 <span style="background-color: red; color: white; border-radius: 50%; padding: 2px;">NEW</span>
Center wavelength	Fundamental	1030 nm	
	With second harmonic module	515 nm	-
Maximum average power	at 1030 nm	> 20 W <sup>1)</sup>	> 100 W <sup>3)</sup>
	at 515 nm	> 6 W <sup>2)</sup>	20 W
Maximum single pulse energy	at 1030 nm	> 20 μJ	> 100 μJ <sup>3)</sup>
	at 515 nm	> 2 μJ	10 μJ
Maximum burst energy	at 1030 nm	> 1 mJ	> 10 mJ
	at 515 nm	> 0.3 mJ	> 1.5 μJ
Pulse duration		< 800 fs	
Long-term power stability, 100 h <sup>4)</sup>		< 0.5 %	
Inter-burst frequency (Fburst)		Single Burst - 10 MHz <sup>5)</sup>	
Intra-burst frequency (Fpulse)		0.8 GHz	
Beam quality		M2 < 1.2	
Beam circularity		> 0.9	
Warm-up time		< 20 min	
Operational temperature		15 - 35 °C	
Total input power		450 W	900 W
Laser dimensions		420 x 294 x 145 mm	
Laser weight		15 Kg	18 Kg

<sup>1)</sup> at 1 MHz, 100 ppb (pulses per burst)

<sup>2)</sup> at 1 MHz, 100 ppb

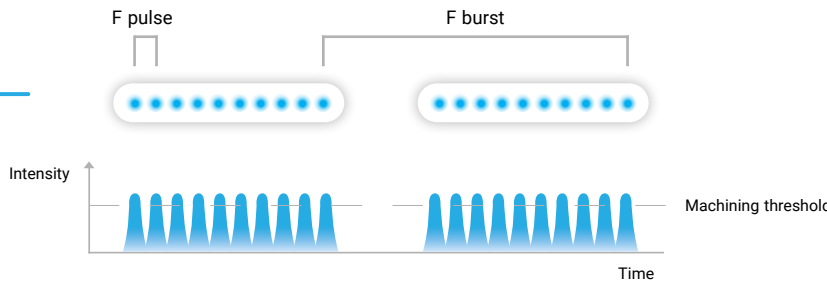
<sup>3)</sup> at 4 MHz, 100 ppb

<sup>4)</sup> Under stable environmental conditions. Expressed as normalized root mean squared deviation (NRMSD)

<sup>5)</sup> Depending on burst settings, a continuous train of GHz femtosecond pulses can be emitted.

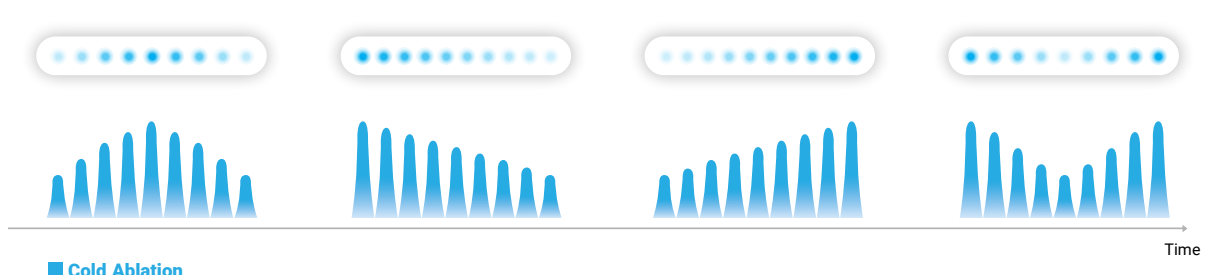


**DANGER:** VISIBLE AND/OR INVISIBLE LASER RADIATION. AVOID EYE OR SKIN EXPOSURE TO DIRECT, REFLECTED OR SCATTERED RADIATION. CLASS 4 LASER PRODUCT.

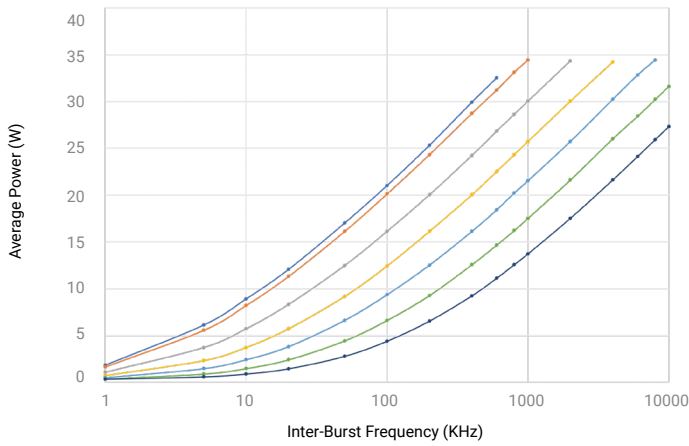


**Our laser enables unmatched modulation of key parameters to optimize precision and machining performance:**

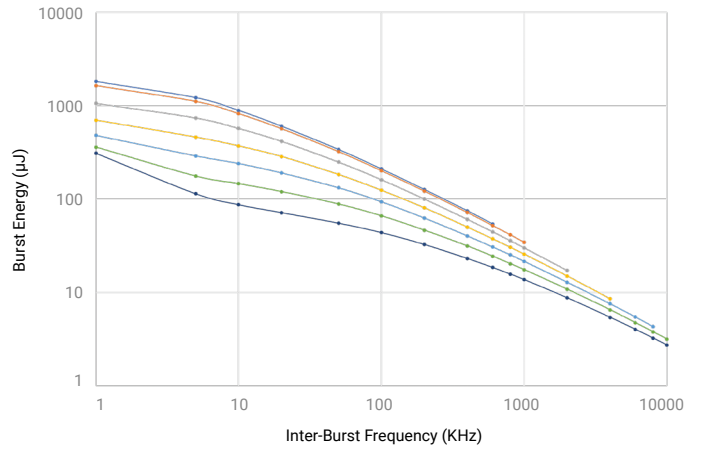
- Burst frequency
- Number of pulses per burst
- Burst intensity distribution



# FEMTOFLASH 20

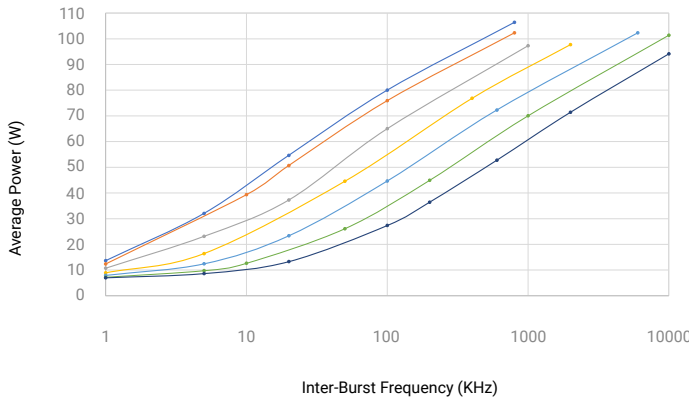


**Fig. 1.** Typical power dependence of FEMTOFLASH 20 laser at 1030 nm on the inter-burst repetition rate.

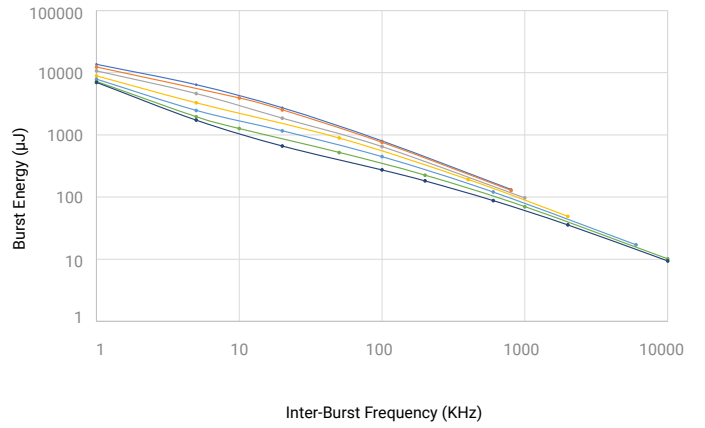


**Fig. 2.** Typical burst energy dependence of FEMTOFLASH 20 laser at 1030 nm on the inter-burst repetition rate.

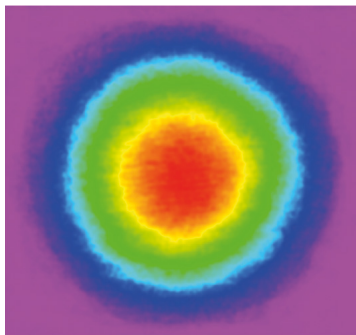
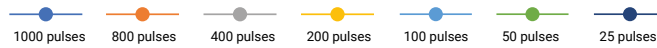
# FEMTOFLASH 100



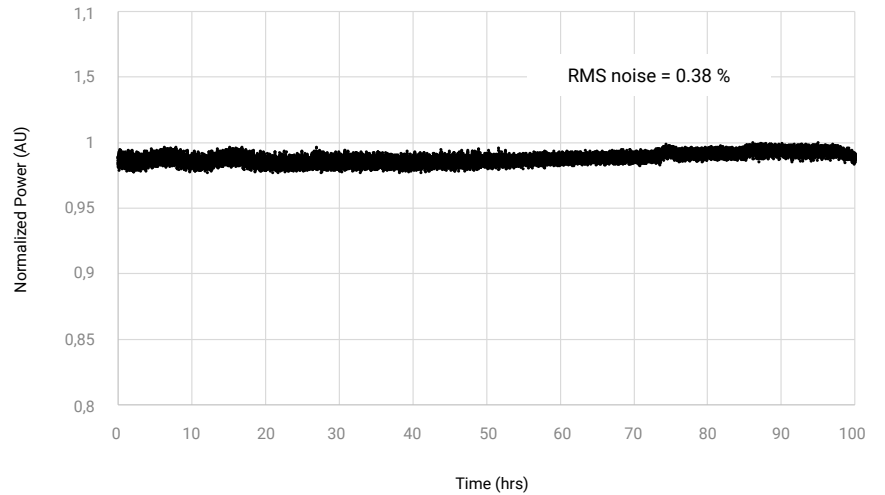
**Fig. 3.** Typical power dependence of FEMTOFLASH 100 laser at 1030 nm on the inter-burst repetition rate.



**Fig. 4.** Typical burst energy dependence of FEMTOFLASH 100 laser at 1030 nm on the inter-burst repetition rate.



**Fig. 5.** Typical output beam profile of FEMTOFLASH laser at 1030 nm.



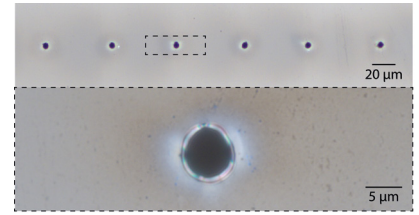
**Fig. 6.** Typical long-term average power stability of FEMTOFLASH laser at 1030 nm under uncontrolled environmental conditions.



## MATERIAL PROCESSING EXAMPLES

### Glasses

Glasses are challenging materials to process due to their transparency and fragility, making laser precision and optimization critical for achieving high-quality results. On glass, the customizable thermal gradient enable by FULL modulation GHz bursts allows crack-free machining. Unlike single-pulse lasers, the higher flexibility in energy distribution across the material can successfully prevent excessive thermal expansion, thereby avoiding cracking.



Borosilicate drilling



High-aspect-ratio drilling in fused silica

### Metals

Burst technology has significantly enhanced high-precision metal marking, enabling efficient black and white marking. The GHz burst's high pulse frequency effectively utilizes residual heat from each pulse, improving material removal and machining speed. Unlike single-pulse or MHz burst lasers, GHz bursts enable faster and more efficient cutting, marking and finishing.



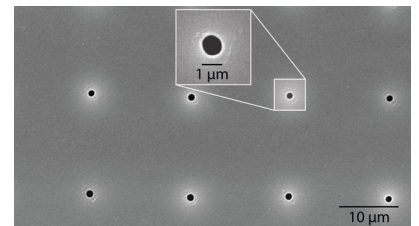
Stainless steel engraving

### Polymers

Polymers are challenging to machine due to their tendency to melt or burn. Precise energy distribution is essential to achieve optimal results. High-frequency flexible bursts are key to polymer processing, enabling the creation of fine features while minimizing heat-affected zones. This approach improves throughput and ensures reproducibility, even in demanding applications like micron-scale hole drilling.



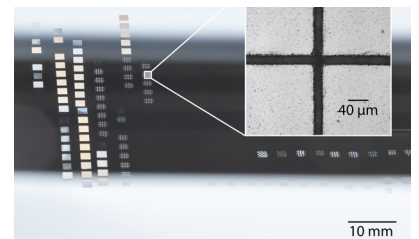
100 µm deep stainless steel engraving with white finish



Polyimide drilling – courtesy of Kirana, EU PULSATE Project

### Semiconductors

Semiconductors are highly sensitive to thermal and mechanical stress during processing, especially in multilayer structures. High-frequency flexible bursts are key to achieving precise energy delivery, allowing fine-tuning that eliminates delamination between layers, prevents crack formation, and minimizes heat-affected zones. This approach ensures clean, high-fidelity structuring even at nanometric scales, making it ideal for advanced semiconductor applications where precision and material integrity are critical.



Silicon micromachining