

FlexBurst™ —

Picosecond micromachining lasers offer “burst mode” with full user control of intra-burst pulse energy distribution

The Lumentum FlexBurst, a flexible pulse burst mode, enables better processing performance in micromachining applications. The term “burst” refers to a group of picosecond pulses with a temporal spacing on the order of tens of nanoseconds. It was demonstrated that such bursts can improve material processing performance. The leading pulses pre-condition the material such that trailing pulses hit the material in a different state, often resulting in improved processing speed and surface quality.

In picosecond micromachining lasers without FlexBurst mode the pulse energy distribution within the burst can not be controlled by the user. As indicated in Figure 1, the pulse energy decreases due to gain depletion in the amplifier. Such a distribution is typically not ideal for material processing applications.

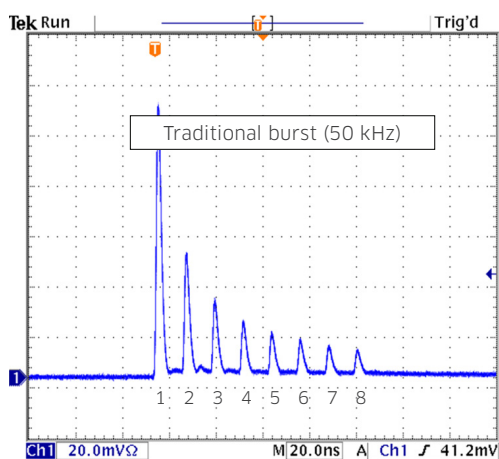


Figure 1: The oscilloscope trace displays one burst of eight picosecond pulses. Without applying the FlexBurst control mode, the pulse energies decrease due to gain depletion in the amplifier.

Figure 2 gives an example of the impact of the FlexBurst technique, allowing for the generation of bursts with arbitrary pulse energy distribution to better match the processing requirements and optimize process performance.

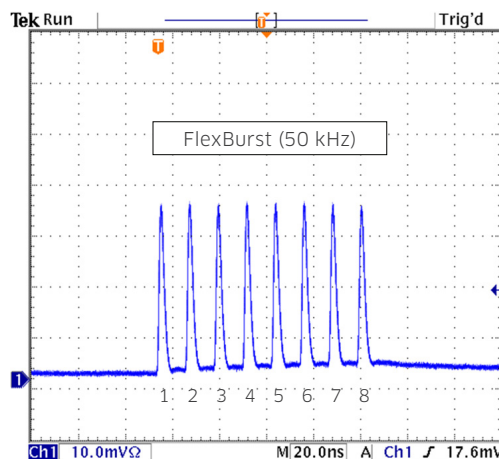
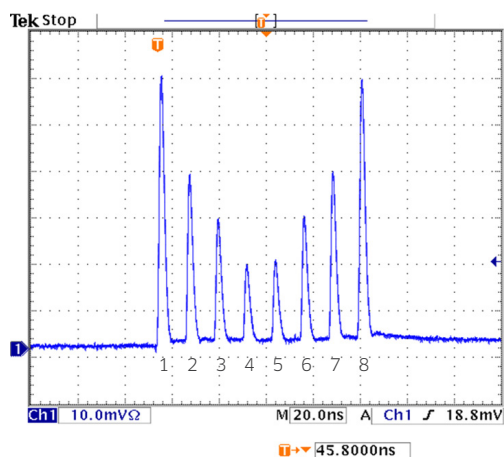
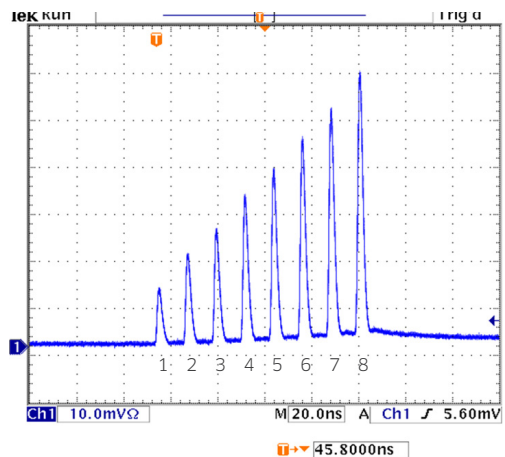


Figure 2: In this example, FlexBurst equalizes the intra-burst pulse energies. In general, the user can set the energy of each pulse arbitrarily

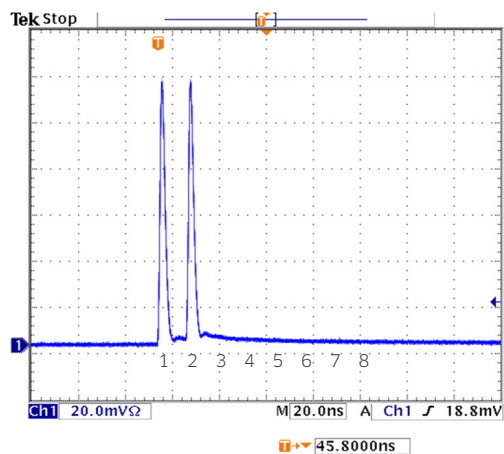
The following oscilloscope pictures further illustrate the versatility of the FlexBurst mode. The traces display picosecond pulse bursts obtained with different settings of the pulse energy distribution. As the energy of each pulse can be arbitrarily set, it is possible to equalize pulse energies, obtain controlled increasing or decreasing pulse energies, blank intra-burst pulses, etc., with virtually no restrictions.



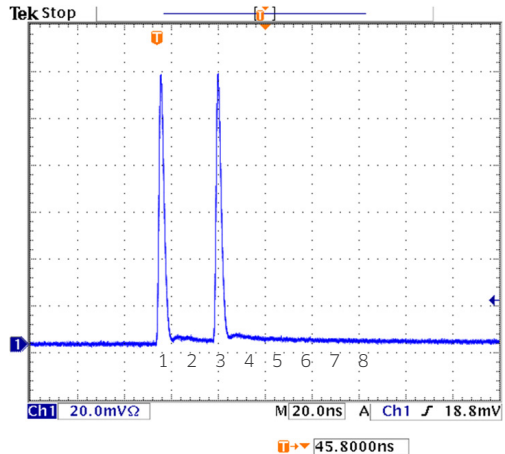
Arbitrary energy distribution



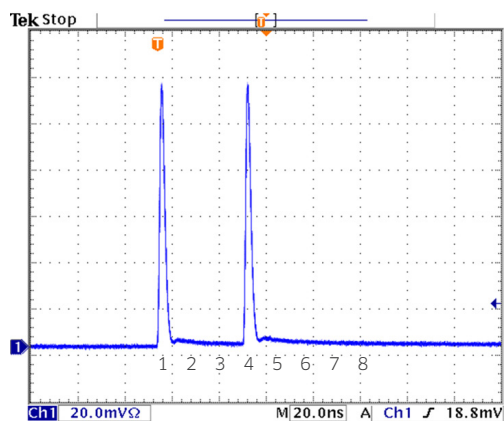
Increasing pulse energy



Blanked intra-burst pulses

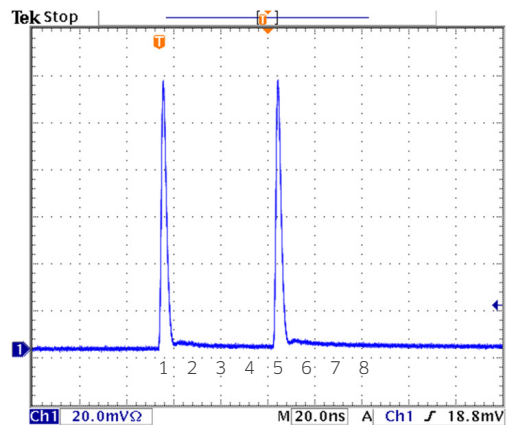


Blanked intra-burst pulses



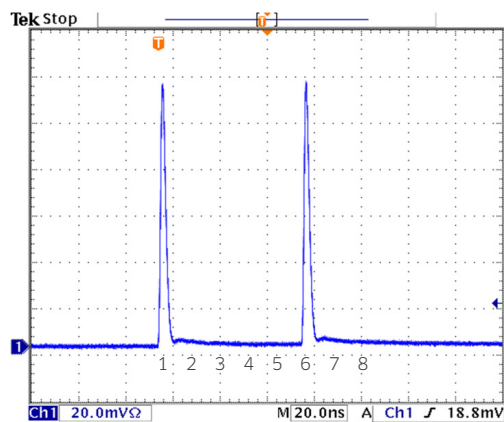
13 Jan 2010
12:55:25

Blanked intra-burst pulses



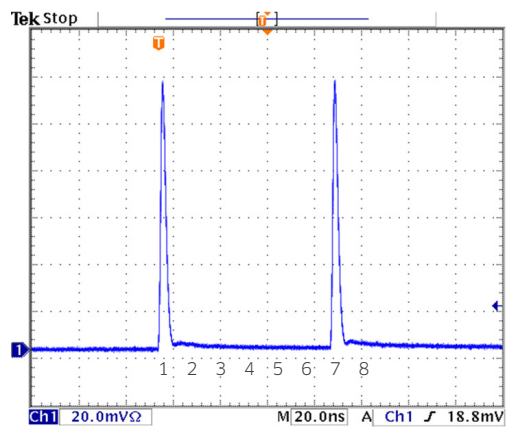
13 Jan 2010
12:57:20

Blanked intra-burst pulses



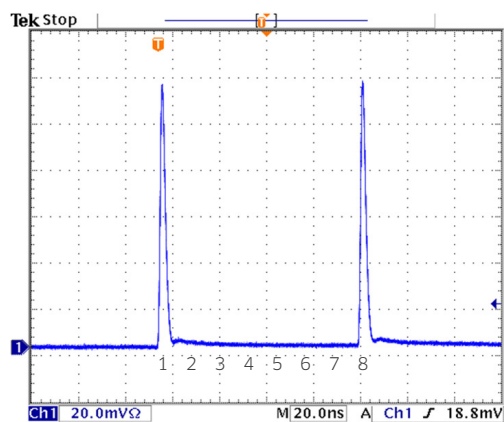
13 Jan 2010
12:58:06

Blanked intra-burst pulses



13 Jan 2010
12:58:44

Blanked intra-burst pulses



13 Jan 2010
12:59:17

Blanked intra-burst pulses

The single-pulse repetition rate of the PicoBlade® laser can be set by the user in the range 200 kHz – 8 MHz for the high power version and 50 kHz – 8 MHz for the medium power. In the FlexBurst mode, the limit of the high power version can be factory-set to less than 200 kHz, as low as 50 kHz, which results in significantly higher burst energies greater than 600 µJ. This is important in some specific applications like cutting of transparent materials.

The FlexBurst mode is compatible with all other options including shorter wavelengths (SHG/THG), and pulse on demand (PoD).

For more information, contact your Sales representative.



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