

Technical Note (1)

Subnanosecond Pulse ACE Laser Models

AOT are actively developing their laser technology to provide customers the option of ACE laser models generating subnanosecond Q-switched pulses. The high extinction provided by E-O Q-switching allows the design of lasers with very high gain and fast pulse dynamics. By appropriate modifications, this allows lasers producing very short pulses.

Early in 2002, AOT will launch its first subnanosecond laser model. This will have a repetition rate capability of 1-20kHz and pulse duration performance down to < 800ps. Average power results obtained from a prototype model are shown in the graph below – Fig (1).

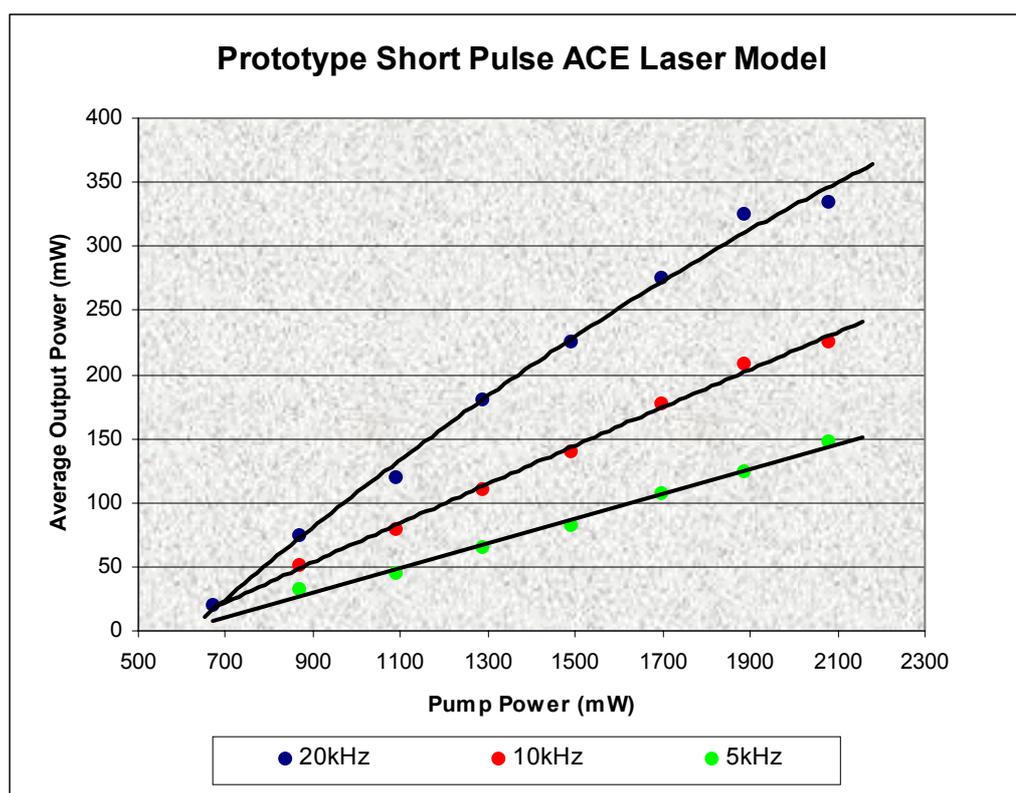


Figure (1)

Attractive for many applications, is the characteristic of ACE lasers whereby the pulse duration is relatively independent of repetition-rate. Fig (2a) and Fig (2b) show that pulses that are 800ps FWHM at 5kHz remain below 1.0ns at 20kHz.

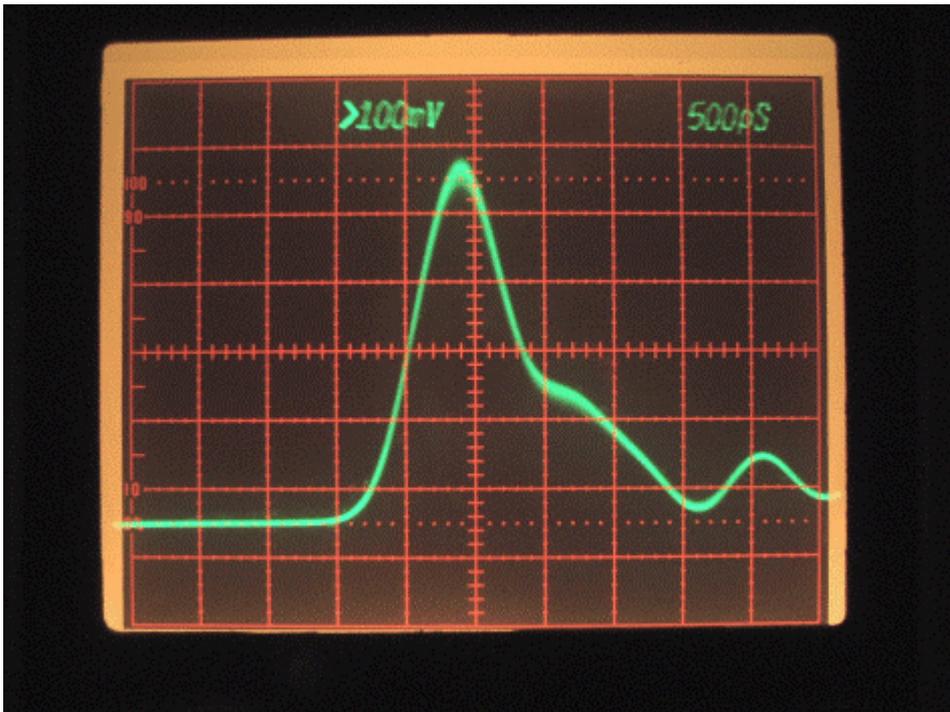


Fig (2a) – 5kHz Performance

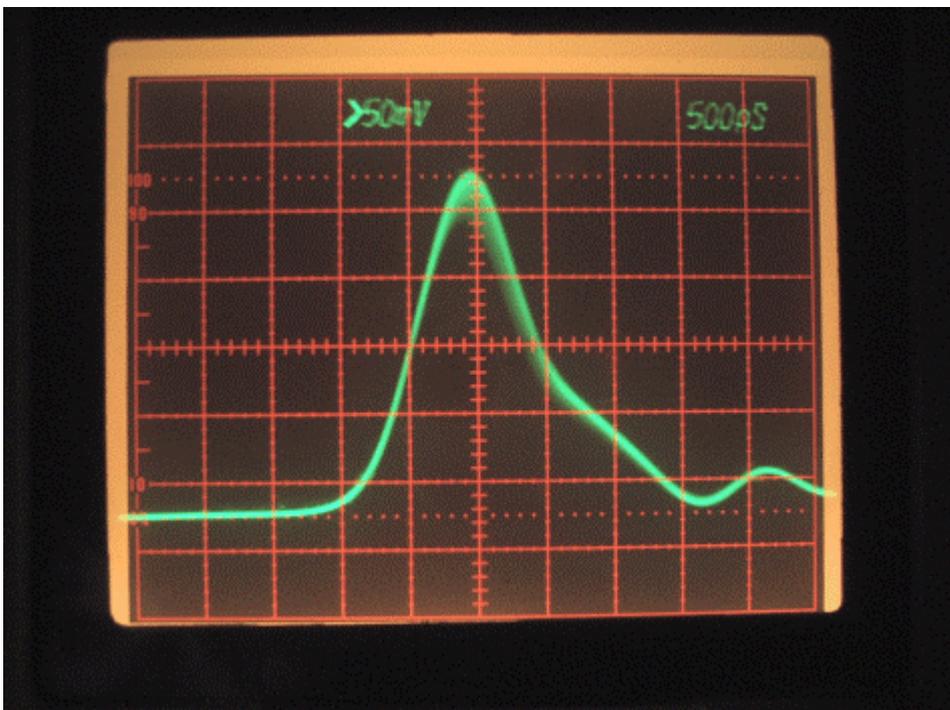


Fig (2b) – 20kHz Performance

As with the standard ACE models, the new short pulse unit achieves excellent beam quality. Coupled with the higher pulse peak power, this readily allows good efficiency for non-linear and parametric processes. For example, the prototype unit allowed 532nm pulse generation in KTP with ~ 55% conversion efficiency. Measurement with high speed detection equipment showed 532nm pulses of duration down to 650ps FWHM.

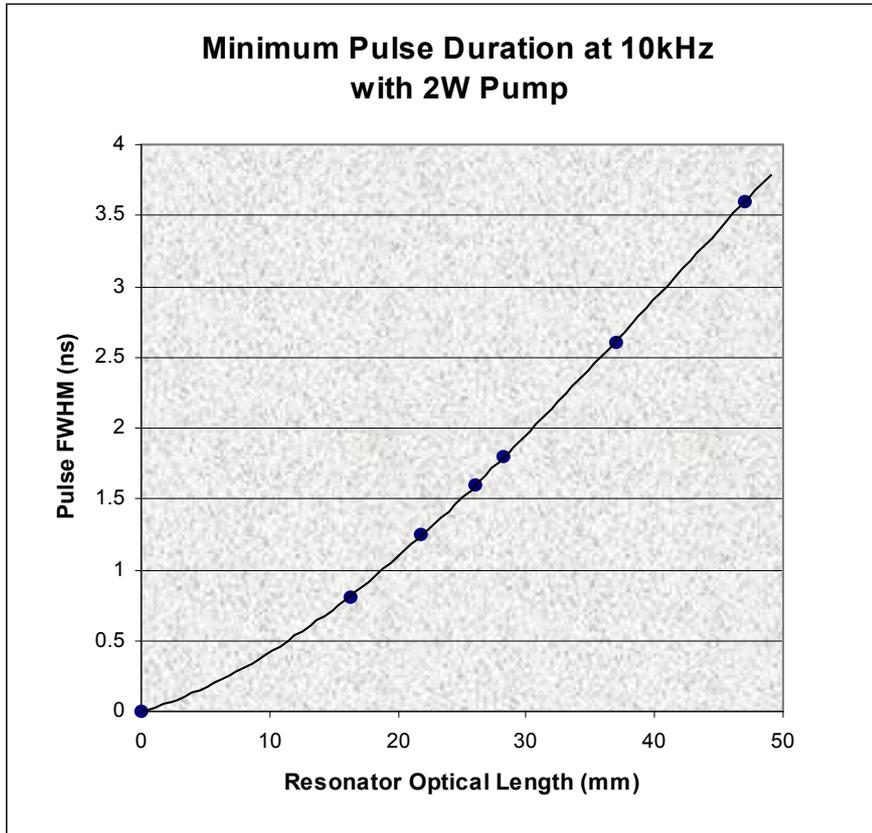


Figure (3)

As part of the programme to offer customers the option of ACE laser units with subnanosecond pulse duration, the Company has been investigating the relationship between the resonator length and the pulse FWHM duration. Some experimental data is shown in Fig (3). From this work we have confidence that ACE laser models reliably producing pulses of < 500ps FWHM duration are perfectly feasible and the Company is planning to introduce models with this performance later in 2002.

The unique subnanosecond pulse and very low jitter (~ 100ps) performance from these lasers are attributes that the Company anticipates will very significantly enhance the attractiveness of lasers to users seeking short pulse sources for their industrial or research applications.