

Technical Note (2)

High Rep-Rate ACE Laser Models

Pulsed diode pumped solid-state lasers (DPSSLs) are used for a wide range of applications in the medical, scientific/research and industrial fields. AOT has recognised that a number of these applications would benefit from ACE nanosecond (and subnanosecond) sources capable of operation at even higher repetition rates, so long as the principal pulse parameters are maintained, since this allows increased data collection rates, increased processing rates, etc.

Via a new product programme, AOT is more fully developing the operating envelope of the ACE laser technology. The Company has demonstrated TEM₀₀ laser performance to 75kHz, and is planning to launch products operating to 100kHz. A key requirement of extended performance products is that they maintain high efficiency, as this translates directly into economic benefit for users. The summary results in Fig (1) below show that the laser efficiency at high repetition rates remains excellent.

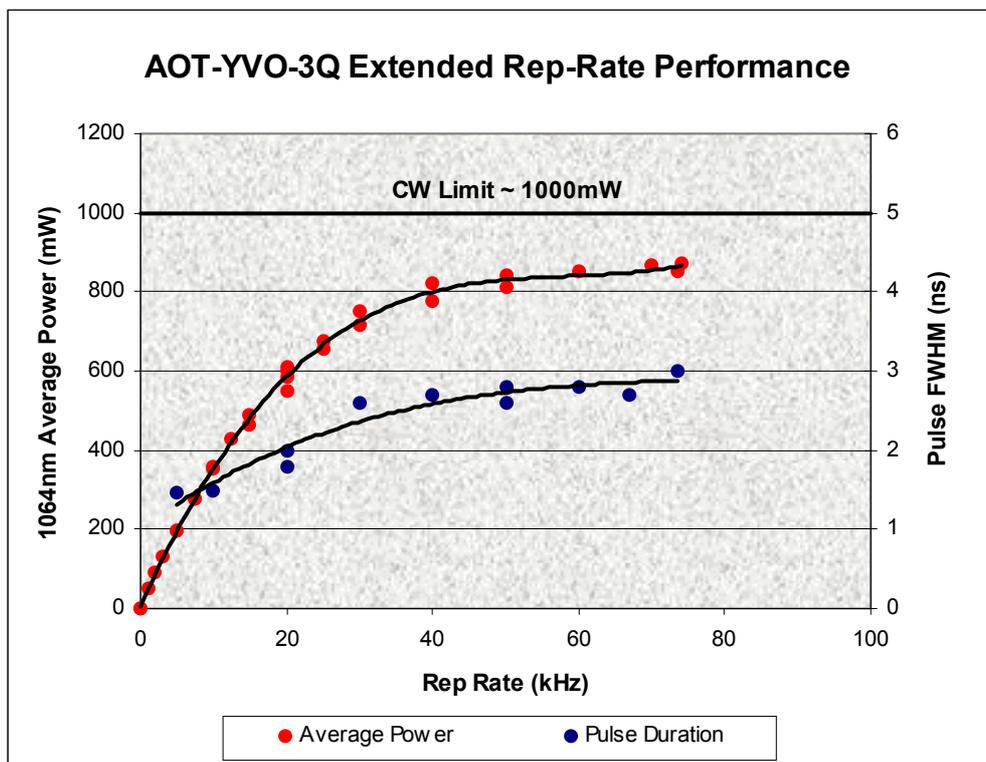


Figure (1)

It can be seen from Fig (1) that the average TEM₀₀ power from the laser at high repetition rates is ~ 850mW and close to the CW power performance. Also, importantly, the figure shows that the AOT-YVO-3Q pulse duration remains short and changes by only x2 over the 1-75kHz operating range under the constant pump power condition ie is ~ 1.5ns at low repetition rates and ~ 3ns and high repetition rates.

The results at 532nm are similarly attractive. Figure (2) shows that doubling the laser output in KTP provides a maximum average power that can be over 250mW at ~40kHz.

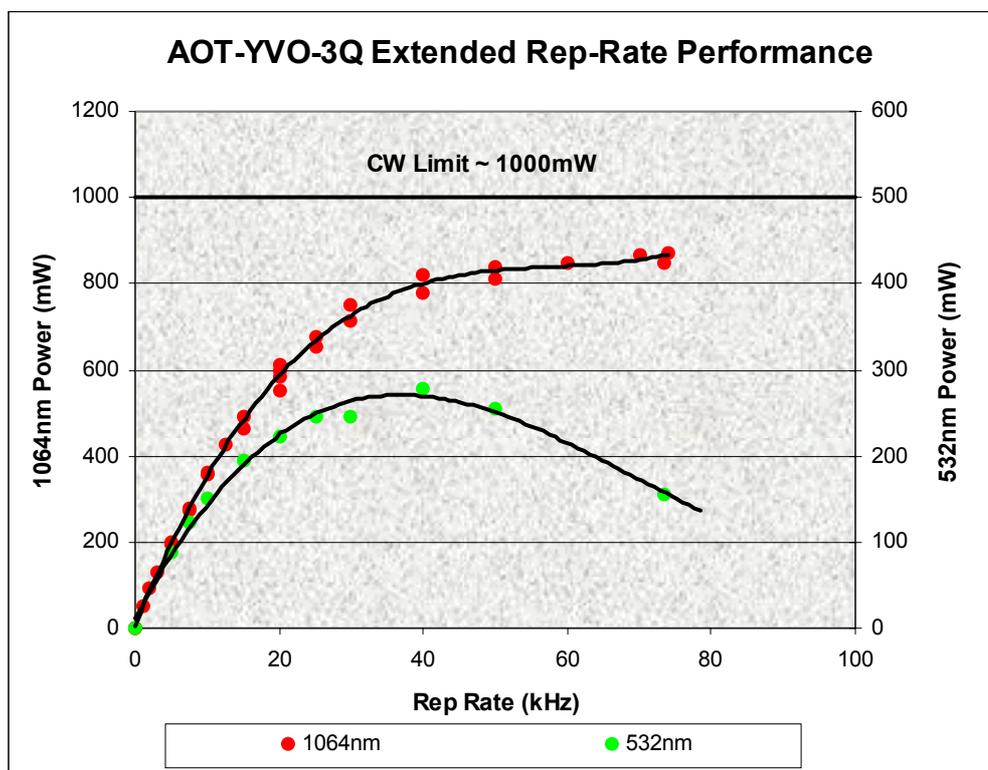


Figure (2)

In similar trials with the new short pulse laser (see Technical Note 1) we have found that the pulse duration also remains short, being only 1.5ns at 75kHz when the average 1064nm power reaches ~ 750mW. In this case, the shorter pulses lead to higher conversion efficiency at the higher repetition rates and 532nm average power remains above 200mW to 75kHz

When complete at the end of 2002, this product development programme will deliver new ACE models operating efficiently to 100kHz. The intention is to extend the current range of ACE lasers to include different models which; operate to over 1W average power, provide pulses of < 1ns across the rep-rate range, and can achieve very low (~ 100ps) jitter relative to an external timing signal.

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