



Q-Switch Option

An acousto-optic Q-switch is a device that causes a continuous Nd:YAG laser to produce a pulsed output. The instantaneous *peak pulse power* generated by a Q-switched laser can be as much as 2,000 times the continuous power rating of a laser. However, these high power pulses are very short, having a typical duration of only 100-300 ns (nanoseconds).

The Q-switch inhibits lasing action for a brief period of time by effecting a optical misalignment of the optical resonator. It is when full RF power from the Q-switch driver (power supply) is applied to the Q-switch that no lasing action occurs. During this brief period, optical energy that is not being emitted from the laser is stored in the YAG laser rod. When optical alignment is once again restored (by removal of RF power to the Q-switch), a pulse of laser energy is allowed to develop inside the optical resonator. Typical RF OFF-time for Series 800 lasers is 10 μ s, during which the laser pulse will be generated. The actual time of pulse emission during this 10- μ s window depends on the setup conditions of the laser (power level, Q-switch frequency, etc.). If a laser is operating at a pulse rate (Q-switch frequency) of 10 kHz, it means that the RF power to the Q-switch is being modulated at a rate of 10 kHz.

Q-switched lasers are commonly used for scribing applications such as laser marking and microcircuit trimming. Q-switching also allows laser emission of high-peak-power pulses for efficient second-harmonic generation (SHG) to achieve 0.53- μ m wavelength (green) emission.

The Q-switch also can be used as a high-speed shutter for fast and precise ON/OFF control of a laser's CW beam output. For this capability, please refer to the technical bulletin, **The Q-switch as a High-Speed Shutter**.

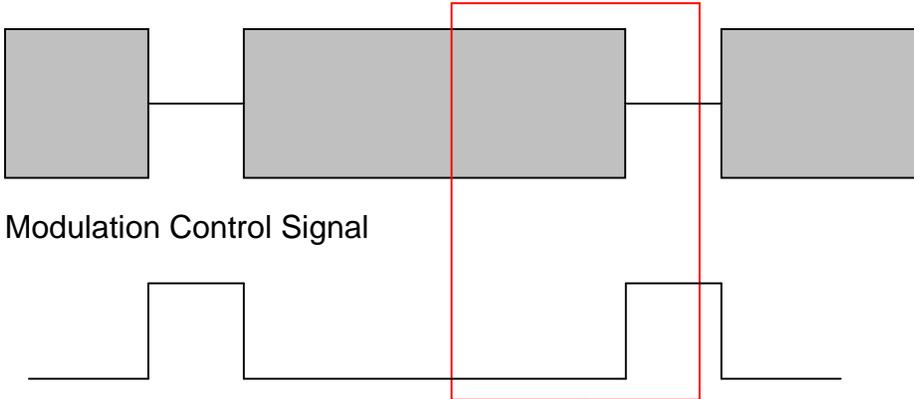
All Lee Laser models with output power up to 250 Watts are available with an *acousto-optic Q-switch* option. The Q-switch allows each CW model to achieve rated Q-switched output capability (which becomes the predominant specification unless specified otherwise). For example, the Q-switch option allows the Model 812T to achieve 812TQ capability.

For actively stabilized models (803ST, 808ST, 812ST, etc.), the active stabilization is not effective in the Q-switched mode of operation. Therefore, when these lasers are operated in the Q-switched mode, the active stabilization should be disengaged.

Q-switch Timing

The diagram below illustrates a typical Q-switch timing sequence for external pulse control.

External clock RF frequency
27.12 MHz



Expanded view of RF cut-off

