



QS-Series BBO Pockels Cells

The **QS-series** Pockels cell/Q-Switch is a product developed for high average power Lasers such as Diode-Pumped Solid State (DPSS) Lasers with powers more than 100 Watts. In this Pockels cell, BBO crystal material is used. This crystal does not suffer from problems similar to KD*P or LiNbO₃ materials, offering the following features:

- | ***Very low resonance operation with the AC voltage, only a few % greater than the DC switch-out voltage.***
- | ***No thermal blooming or photo-refractive damage.***
- | ***Typical contrast ratios of >2000:1 without high temperature degradation and high average powers more than 100 watts.***
- | ***Low insertion loss of 3 ~ 2% inside the Laser cavity.***
- | ***Extremely small capacitance (~2pF), giving a very fast rise-time (<220 psec) in a lumped element 50 ohm system.***
- | ***Material damage threshold is more than 4 GW/cm² typical @ 1064nm for a 10ns pulse. And is limited by the AR coating.***
- | ***Can operate with average High Voltage as much as 1KV without electrode migration.***
- | ***Usable for pulse extraction from UV (200nm) to Mid-IR (2000nm).***
- | ***Cells with larger apertures up to 6 mm are available with 8.8KV quarter-wave voltage at 1064 nm. Model QS-6-HW***

Model QS-series Pockels cell/Q-Switch

The Model QS-series uses BBO crystal material, which has symmetry similar to LiNbO₃. The laser beam propagates along the optic Z-axis and the electrodes are applied along the X-axes. The transverse Pockels effect is utilized, and increasing the aspect ratio or number of BBO crystal cells can decrease quarter-

wave voltage. The contrast ratio is superior even at temperatures over 40°C, and the uniformity over the whole aperture is excellent. Unlike LiNbO₃, BBO is not pyro-electric, nor does it suffer for the most part from piezo-electric resonances. Also, it has an excellent resistance to thermal fracture.

Based on typical diode-pumped laser parameters, this Q-Switch Model QS-series extends simple compact Q-Switched operation of diode-pumped lasers to high average powers of 30-100W. Also, the low dispersion of the QS-series Pockels Cell eminently suits it for applications in short pulse, regenerative amplifiers. The Super Switch is ideal for Q-Switching of high power compact DPSS Lasers at sub-nanosecond speeds.

Model QS-series Details

Parameter	QS-3	QS-4	QS-5-2	QS-6
Aperture (mm)	3	4	5	6
V_{1/4} KV@1064nm	4.6	6.2	3.8	9.0
Insertion Loss (1064nm)	<2~3% (Typical)			
Contrast Ratio (1064nm)	>2000:1 (Typical)			
Wavefront Distortion (633nm) ?	? /10			
Spectral Range (nm)	200 - 2000			
Typical Risetime (ps)	220			
Dimensions (mm)	25 dia. 40 long	/	50 dia 60 long	

NOTES:

- 1) V_{1/4} is directly proportional to the wavelength and inversely proportional to the aspect ratio of the crystal, L/D where D is electrode distance and L is the length.
- 2) In some applications the windows, although AR coated, add excessive insertion loss and may be eliminated. In these cases a 5-watt heater and thermostat for feedback control would be required to keep the temperature around 40°C. Heating of the cell is to prevent moisture from eventually affecting the polish on the face of the crystal in the absence of windows and should be continuous, even backed-up with a battery device in case of a power failure.

Quantum Technology, Inc. specializes in supplying entire turnkey systems and High Voltage Pulsers such as series HVP-500, our 5GP50, and 7GP10 drivers. Please contact Quantum Technology, Inc. at +407-333-9348 or e-mail us at staff@quantumtech.com for further information. Quantum Technology has been in the electro-optics field for over thirty years. Let our experience work for you.