



# QUANTUM TECHNOLOGY, INC.

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**SERIES QC  
KD\*P  
Q-SWITCHES  
DATA SHEET 722**

## SERIES QC KD\*P POCKELS CELLS

The series QC Pockels cells utilize high quality strain-free crystals oriented in the longitudinal mode incorporating a cylindrical ring electrodes for uniform electric fields. These Pockels cells are sealed units with AR coated windows and filled with an inert index-matching fluorocarbon fluid (FC-43) to minimize transmission losses. The windows are only generally aligned to the crystal faces to minimize disturbance of the optical path. The optic axis of the crystal is aligned parallel to the cell, and thus to the beam, within 3 minutes of arc. This type of accuracy is necessary for the Pockels cell to operate optimally. Also, the X and Y axis of the crystal must be parallel and perpendicular to the plane of polarization of the laser. Dry cells (suffix -D) with dual AR coated windows are available also.



These are available in usable apertures from 6 to 24 mm. Series LAP large aperture Pockels cells are also available and are described in our product catalog. Windows are AR coated at the specific wavelength of the laser. Standard cells are supplied with crystals having 95% deuteration and resistivity of  $10^9$  ohm-cm. Also available are crystals with 98-99% deuteration level and with resistivity greater than  $10^{10}$  ohm-cm for increased optical isolation and improved performance at elevated temperatures. Models QC-6-2 and QC-10-2 are two crystal designs of 6mm and 10mm apertures respectively. Table 1 describes the optical, electrical and physical parameters of the series QC Pockels cells.

**TABLE 1  
OPTICAL AND ELECTRICAL CHARACTERISTICS OF SERIES QC POCKELS CELLS**

Model	QC-6-2	QC-6	QC-8	QC-10J	QC-10	QC-10-2	QC-16	QC-20	QC-24
<b>OPTICAL PARAMETERS</b>									
Aperure (mm)	6	6	8	9	10	10	16	20	24
$\lambda/4$ voltage KV (at 1064nm)	1.7	3.4	3.4	3.4	3.4	1.7	3.5	3.6	3.6
$\lambda/4$ voltage KV (at 694nm)	1.1	2.2	2.2	2.2	2.2	1.1	2.3	2.4	2.4
Deuteration Level (nominal)	95%	95%	95%	95%	95%	95%	95%	95%	95%
Insertion loss (at 1064nm)	2.1%	1.8%	1.8%	2.0%	2.0%	2.5%	2.5%	3.0%	3.0%
Contrast Ratio	>1000:1								
Wave-front Distortion (max.)	$\lambda/10$								
Wavelength Range	400-1100 nm								
<b>ELECTRICAL PARAMETERS</b>									
Capacitance, pF (1KHz)	8	4	4	5	5	10	7	10	15
Typical Rise-time (nsec)	<1	<1	<1	<1	<1	<1	<1	<1.5	<1.8
<b>PHYSICAL PARAMETERS</b>									
Connectors <sup>2</sup>	.040 " pin jacks				4-40 threaded terminals				
Weight (gm)	200				300	500	300	500	500
NOTE : (1) Quarter-wave voltage is directly proportional to wavelength. (2) For QC-10 through 24, plastic caps on the two connectors protrude 1/2 inch above the cylindrical body. (3) Dry cells are available with -D suffix and with AR coated with Quantum's Sol Gel equivalent "Poly Coat"									

Please specify the proper wavelength of the laser for desired AR coatings. QC-10J and QC-10 have identical parameters except QC-10J is a miniature 1 inch diameter cell and is index-matched with FC fluid only. All other models are available with other index-matching fluids such as Deuterated Decalin. The KD\*P cylinder is held in a hermetically sealed, shock proof epoxy free mount to ensure years of reliable long term service. These cells may be used at typical power levels over 500 MW/cm<sup>2</sup> peak powers and 40 watts average powers.

All models can be fabricated with two crystals and are designated with the suffix 2, such as models QC-6-2 and QC-10-2. Typical parameters of these models are shown in Table 2. These two crystal devices operate at lower voltages, generally for extra-cavity half wave applications.

For example, if the quarterwave voltage for a QC-10 (a single crystal element) is 3.4KV, then the halfwave voltage for a QC-10-2 (dual crystal element) would be the same voltage.

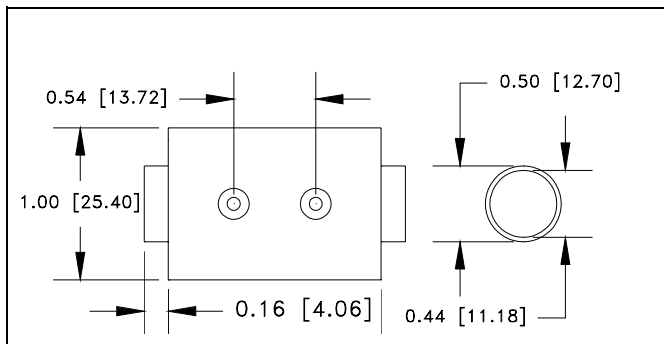
On special order, larger apertures of 50 mm or more are available. These units have cylindrical ring electrodes design (Model LAP 50 for example).

For very low insertion loss a Brewster angled KD\*P Pockels cell, such as Model QC-8-BR may be used. It has a useful aperture of 8mm. See table 3 below, as well as, Data Sheet 729.

**TABLE 2**  
**QB-8-BR SPECIFICATIONS**

Optical Power density (max)	500 MW/cm <sup>2</sup>
Wavefront distortion	< lambda/6
Lambda/4 voltage (1064 nm)	3.8 KV
Transmission	> 99 % from 400-900 nm
Capacitance	7 pF
Beam Displacement	~12 mm
Connectors	isolated 4-40 studs
Dimension	2 x 1 x 1 cu in.
Weight	100 gm

**QC-series - Models QC-8 and QC-10J**  
Outline Dimensions inch (mm) below.



**ALSO AVAILABLE: BBO, RTP and LITHIUM NIOBATE Q-SWITCHES**

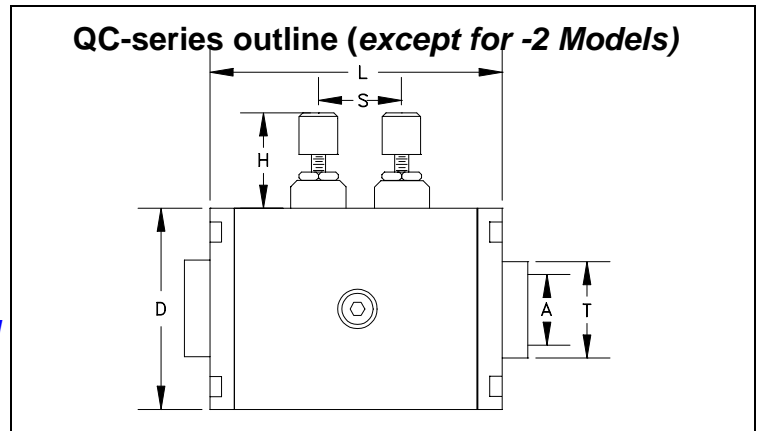
Quantum Technology has developed it's QS-series Super Switch Line of Pockels cells for average powers of 30-100W, using BBO Crystal Material. These high powers are typical of Diode-Pumped Solid State (DPSS) Lasers. BBO Crystal material does not suffer from some problems which may arise in KD\*P or LiNbO<sub>3</sub> materials. The QS-3 series is ideal for Q-switching of high power compact DPSS Lasers at sub-nanosecond speeds. Please refer to Data Sheet 718. For Lithium Nioate Q-switches (LN-series), see data sheet 738.

**TABLE 3**  
**Two Crystal Pockels Cells**  
**Models QC-6-2 and QC-10-2**

Crystal Material	KD*P
Rise Time	<1 nsec
Optical Loss (AR Windows)	<2% with DC index matching fluid <sup>1</sup> <5% with FC 43
Damage Threshold	>400 MW/cm <sup>2</sup>
Contrast Ratio @1064 nm	>800:1
Quarter Wave Voltage	1.7KV

NOTE: (1) Decalin Fluid  
(2) Fluoro-Carbon Fluid  
(3) Suffix -D for dry cell (filled with N2)

**QC-series outline (except for -2 Models)**



**TABLE 4**  
**Models QC-6-2 through QC-24**  
Outline Dimensions inch (mm) below.

\*Dual crystal Pockels cells have three (3) terminal

	L	D	A	S	T	H
QC-6-2*	2.00 (50.8)	1.00 (25.4)	0.24 (6.0)	0.64/ea* (16.3)	0.30 (7.62)	3 PINs as QC-8
QC-10	1.80 (45.7)	1.37 (34.8)	0.44 (11.2)	0.50 (12.7)	0.50 (12.7)	0.50 (12.7)
QC-10-2*	3.1 (78.2)	1.375 (35mm)	0.40 (10)	0.91 (23.1)	0.50 (12.7)	3 POSTs as QC-10
QC-16	2.24 (56.9)	1.62 (41.2)	0.63 (16.0)	0.63 (16.0)	0.75 (19.1)	0.50 (12.7)
QC-20	2.24 (56.9)	1.62 (41.2)	0.82 (20.8)	0.63 (16.0)	1.02 (25.9)	0.50 (12.7)
QC-24	2.63 (66.8)	2.00 (50.8)	0.94 (23.9)	1.00 (25.4)	1.00 (25.4)	0.50 (12.7)