

Pockels Cells

Pockels cell is an electro-optical modulator for polarization control of the laser beam. The key element of the Pockels cell is an electro-optical crystal, which produces or changes birefringence, when high voltage is applied to it. Induced birefringence or refractive index modification in the material by the electric field is called electro-optic effect or Pockels effect. Electro-optic effect is observed only in non-centrosymmetric crystals.

Typical applications of Pockels cells are Q-switching of laser cavity, laser cavity dumping, pulse picking, light coupling into and from regenerative amplifier, continuous wave laser beam chopping.

KTP / RTP POCKELS CELL – PCK / PCR

Features

- Lower operating voltage required compared to other types of Pockels cells
- Operates at high duty cycles
- Very low piezo-electric resonances
- Standard apertures: 4x4 and 6x6 mm
- Thermally compensated double-crystal configuration

PCK/PCR series Pockels cells developed at EK SMA Optics are based on specially grown high resistivity KTP or RTP crystals. The outstanding feature is possibility to operate KTP/RTP Pockels cells at high duty cycles or even to keep at high voltage for longer.

KTP/RTP Pockels cells can be supplied in standard one inch housing or in open-type OEM mount when small footprint is required.



PCK4 / PCR4

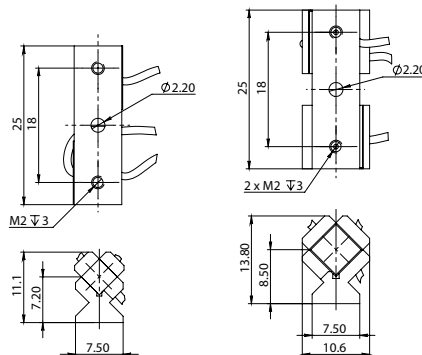
Applications

- Q-switching for high repetition rate lasers 1 kHz – 6 MHz
- Pulse picking of high repetition rate lasers

Specifications

MODEL	PCK4	PCK4-O	PCK6	PCK6-O
Clear aperture, mm	Ø3.5		Ø5.5	
Quantity of crystals	2			
Half-wave voltage (@ 1064 nm), kV DC	< 1.8		< 2.8	
Capacitance, pF (typical)	4		< 6	
Optical transmission	> 98 % at 1064 nm			
Contrast ratio	> 1:500			
Cell size, mm	Ø25.4x42.2	25x11.1x7.5	Ø25.4x42.2	25x13.8x10.6

Specifications are subject to change without advance notice.



PCK4-O drawing

PCK6-O drawing



PCK4-O / PCK6-O

KD*P PCKELS CELLS – PC / D-compact / D-mini

Features

- Low absorption and high deuteration material
- High damage threshold dielectric AR coatings for requested wavelengths
- Operating voltage does not depend on crystal aperture, so large apertures are available
- Suitable for fs applications due to low GVD
- Single-crystal based three terminal design available upon request

Applications

- Q-switching of flashlamp pumped high energy and low repetition rate diode pumped lasers
- Pulse picking
- Laser cavity dumping

KD*P (DKDP) is one of the electro-optical crystals used for Pockels cells. The most popular application of KD*P (DKDP) crystal based Pockels cell is Q-switching of laser cavity. DKDP Pockels cell can be used for lasers emitting in the range of 400 – 1100 nm.

High energy and short output pulse formation during Q-switching of laser cavity process is realized with KD*P (DKDP) Pockels cell in the most of commercially available flashlamp pumped Nd:YAG and Ruby lasers, low repetition rate DPSS lasers like Nd:YAG, Nd:KGW, Nd:YLF, Nd:Glass and other lasers.

Electro-optical KD*P (DKDP) crystals produced by EKSMA Optics have high damage threshold dielectric AR coatings (LIDT > 10 J/cm², 10 ns, 10 Hz, 1064 nm), feature long lifetime without degradation of the coatings and show reliable operation with pulsed high energy lasers.

PC12SR, PC20SR, D-Compact, D-Mini and three terminal DKDP Pockels cells have AR-coated protective windows on both ends. Windows can be flat or wedged or in non-parallel, laser beam shift compensating configuration to eliminate etalon effects in the Pockels cell and laser cavity.

The rectangular shape PC5S, PC5D and PC10S DKDP Pockels cells are provided without protective windows and typically are used in hermetically sealed lasers.

Single-crystal based three terminal DKDP Pockels cell series are designed especially to be controlled by bipolar Pockels cell drivers. Ground connector is located in the center, positive and negative connectors are located on the sides.

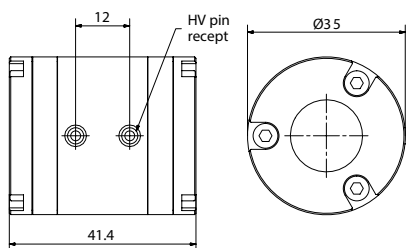
EKSMA Optics offers wide range of HV drivers for the Pockels cells and power supplies for the drivers which are presented in the next chapter of this catalogue.



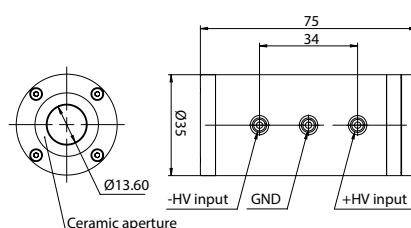
Specifications

MODEL	PC20SR	PC14x45SR	PC12SR	D-compact/12	D-compact/9	D-mini/9	D-mini/8	PC10S	PC5S	PC5D
Clear aperture, mm	Ø 18	Ø 13		Ø 11		Ø 8	Ø 7	9.5 × 9.5	4.5 × 4.5	
Quantity of crystals	1								2	
λ/4 @ 1064 nm voltage, kV DC	< 3.4	< ±1.7				< 3.4				< 1.7
Capacitance, pF (typical)	< 10			6			3	4	1.5	3
Optical transmission	> 97 % at 1064 nm									
LIDT of AR coatings	> 1 GW/cm ² (10 J/cm ²), 1064 nm, 10 Hz, 10 ns									
Contrast ratio	> 1:2000									> 1:1000
Cell size, mm	Ø35×51	Ø35×75	Ø35×41.4	Ø25.4×39	Ø25.4×35	Ø19×25.4	Ø19×19	22×18×33	18×14×25	23×16×52

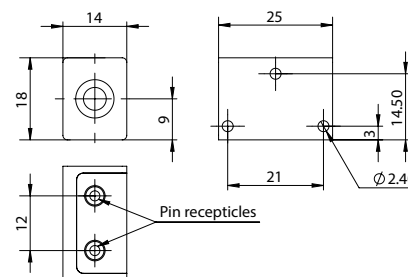
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PC12SR drawing



PC14x45SR drawing



PC5S drawing

BBO POCCKELS CELLS – PCB

Features

- Minimal piezoelectric ringing
- Very low absorption and suitability for high power laser applications
- Reliable design for operation up to 3 MHz HV pulse repetition rate
- Broad transmission rate from 200 to 2000 nm
- Pockels cell with active cooling available upon request

BBO Pockels cells are transverse field devices. Low electro-optical coefficient of BBO results in higher operating voltages. The operating voltage is proportional to the ratio of electrode spacing and crystal length. Double crystal design is employed to reduce required voltages and to allow operation in half-wave mode with fast switching times.

Low piezoelectric ringing makes these Pockels cells attractive for the control of high-power and high pulse repetition rate

lasers. Fast switching electronic drivers properly matched to the cell are available for Q-switching, cavity dumping and other applications.

Quatro BBO Pockels cell employs quadruple crystal design with an independent control of two sides, meaning this Pockels cell can be controlled by two synchronized sets of Pockels cell drivers enabling advanced polarization control.

Applications

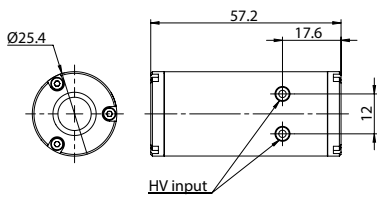
- High repetition rate Q-switching
- Pulse picking at up to 3 MHz rate
- Laser cavity dumping
- Pulses coupling into and from regenerative amplifier



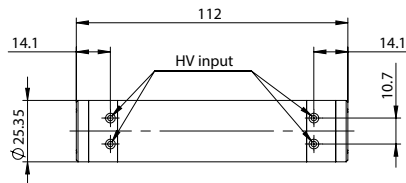
Specifications

MODEL	PCB3S	PCB3D	PCB4S	PCB4D	PCB6.3S	PCB6.3D	PCB4Q
Clear aperture diameter, mm	2.5		3.5		5.8		3.5
Quantity of crystals	1	2	1	2	1	2	4
$\lambda/4$ voltage (@ 1064 nm), kV DC	< 3.5	< 1.8	< 4.6	< 2.3	< 7.5	< 3.8	$2 \times < 1.3$
Capacitance, pF (typical)	4	6	3	6	6	< 8	$2 \times < 6$
Optical transmission	> 98 % at 1064 nm						
LIDT of AR coatings	> 0.5 GW/cm ² (5 J/cm ²), 1064 nm, 10 Hz, 10 ns						
Contrast ratio	> 1:1000	> 1:500	> 1:1000	> 1:500	> 1:1000	> 1:500	> 1:500
Dimensions, mm	Ø25.4×37.2	Ø25.4×57.2	Ø25.4×37.2	Ø25.4×57.2	Ø25.4×42.2	Ø35×68	Ø25.4×112

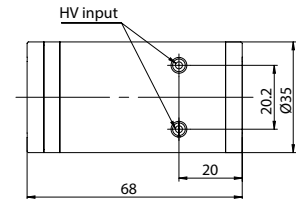
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PCB3D, PCB4D drawing



PCB4Q drawing



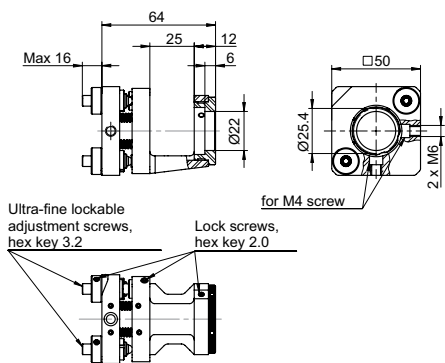
PCB6.3D drawing

MOUNTING STAGE FOR PCKELS CELLS OF Ø25.4 mm – PM1

PM1 series mounting stage is designed for holding and positioning of Ø25.4 mm Pockels cells. The mount has ultra-fine thread lockable adjustment screws.

Specifications

MODEL	PM1
Adjusting angles, tilt and tip, deg	±3.5
Rotation along Z-axis, deg	180
Adjustment screw thread	M6×0.25
Screw sensitivity, µm	0.5



MOUNTING STAGE FOR PCKELS CELLS OF Ø35 mm – HPR-35

HPR series mounting stage is designed for holding and positioning of Ø35 mm Pockels cells. HPR stages with fine or ultra-fine screws are available upon request.

Specifications

MODEL	HPR-35
Adjusting angle along X and Y axis, deg	9
Rotating angle along Z-axis, deg	20
Beam height above breadboard, mm	50
Adjustment screw thread	M6×0.5
Screw sensitivity, µm	1.5

