

Electro-Optic Cells

An electro optic cell (or Pockels cell) allows to control the optical phase of a laser beam going through it. The phase change depends on the voltage applied to the cell. Two main configurations can be found depending on the relative position of the electrodes vs.laser beam propagation direction : transverse electric field or longitudinal electric field.

Transverse electric field cells (electric field is perpendicular to the laser beam propagation direction) have a high optical aperture (up to 50 mm) but require a high voltage (several KVolts). Used on small aperture (1 to 2 mm), they also allow to reach the shortest achievable commutation time (40 ps). This is typically used for Q-Switching a laser cavity operated at low repetition rate (a few Hz to a few 10's of Hz).

All models listed hereunder are using KD*P and can be operated from 400 to 1100 nm.

Main Specifications

Model	Aperture (mm)	Contrast	1/4 Wave Voltage V _{λ/4} (kV) @500 nm	Rise Time (ns)
IMPACT-10*	10	1500/2000 :1	-	3.3
QX-1020*	9.5	2200/4000 :1	-	3.2
QX-1320*	12.3	1500/4000 :1	-	3.5
QX-1630*	15.2	1800/3500 :1	-	3.3
QX-2035*	19.5	1600/3000 :1	-	3.5
TX-2042	19.5	3000/8000 :1	-	6.4
TX-2650	25	2500/8000 :1	-	6.4
TX-3460	33.3	1500/6000 :1	-	6.7
TX-5065	49.5	500/3000 :1	-	6.9
TX-7595	73.5	300/800 :1	-	7.3
TX-100D	99	100/200 :1	-	7.7
1041**	10	800 :1	1.75	3.2
1042**	10	500 :1	0.9	1.6
1043**	16	600 :1	1.75	3.2
1044**	16	400 :1	0.9	1.6
1056**	10	800 :1	1.75	3.2
1058**	16	600 :1	1.75	3.2
1059**	10	1000 :1	1.75	3.2
1071**	10	800 :1	1.75	3.2
1072**	10	500 :1	0.9	1.6
1073**	16	600 :1	1.75	3.2
1074**	16	400 :1	0.9	1.6
1080**	6.5	800 :1	1.75	3.2
1091	25	500 :1	1.9	3.5
1092	50	250 :1	2.2	4
1111	2.5	1000 :1	1.75	3.2
1112	2.5	800 :1	0.9	1.6

* Deuteration rate > 99% ** Deuteration rate > 98%

Q-Switches with integrated drivers :

Acal BFi can also provide fully integrated devices (cell + driver) allowing 1.5 ns rise time at up to 10 kHz. This is a cheaper and more compact alternative, although less flexible. It requires 24VDC supply.

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Longitudinal electric field cells (electric field is parallel to the laser beam propagation direction) are limited to a small optical aperture (typically 3.5 mm) but require a much lower driving voltage, allowing the use of cheaper drivers and/or operation at higher repetition rates (up to 400 MHz).

A variety of materials are available for this mode of operation. Each with specific features and benefits.

Material selection

- ADP : it can be used from 300 to 750 nm and does not exhibit piezo resonances in the frequency domain of use.
- LTA : adequate for wavelengths from 700 to 4500 nm (except model 360-160, limited to 800 - 4500 nm). It exhibits the lowest quarter-wave voltage and the longest acceptable wavelengths. It has some piezo resonances but they are few and very narrow (ask for details).
- KD*P : it can be used from 300 à 1100 nm and is a good trade-off between ADP and LTA. This is the most commonly used material today.
- Available on request : BBO : now available in good qualities at a reasonable price, it allows, thanks to the absence of piezo resonances, to provide modulation at up to 100 kHz in the 300 - 1500 nm spectral range (optical rise time < 3 ns). 3.25 mm aperture is standard and 7 mm available on a custom configuration.
- Available on request : RTP : like BBO, it has no piezo resonance. On top, it can be used from 350 to 4300 nm and the optical aperture can be up to 15 mm. Being non hygroscopic and relatively cheap, it is a very promising material.

Main Specifications

Model	Material (mm)	1/4 Wave Voltage V/4		Useful aperture (mm)	Contrast ratio	
		(kV) @500 nm @1064 nm			@ 633 nm	@ 1064 nm
350 - 50	KD*P	455	NA	3.1	500 : 1	700 : 1
350 - 80	KD*P	261	522	2.7	500 : 1	700 : 1
350 - 105	KD*P	226	482	3.1	500 : 1	700 : 1
350 - 160	KD*P	130	NA	2.7	300 : 1	NA
350 - 210	KD*P	113	NA	3.1	300 : 1	NA
360 - 40	LTA	NA	400	2.7	NA	300 : 1
360 - 80	LTA	NA	183	2.7	NA	200 : 1
360 - 120	LTA	NA	138	2.7	NA	200 : 1
360 - 160	LTA	NA	92	2.7	NA	100 : 1
370	ADP	194	NA	2.5	500 : 1	NA
370-LA	ADP	263	NA	3.5	500 : 1	NA
380	ADP	92	NA	2.5	500 : 1	NA
390	ADP	115	NA	3.5	500 : 1	NA