

# LASER COMPONENTS CATALOG

High Quality Laser Accessories

**CASTECH**<sup>®</sup>  
福晶科技



# CASTECH<sup>®</sup>

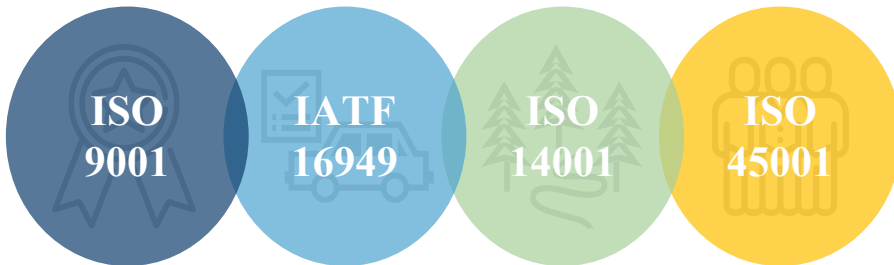
福晶科技

## C A S T E C H , I N C .

Nonlinear Optical Crystals · Laser Crystals · Precision Optics · Laser Components

### — ABOUT US —

After 30 years' rapid growth, CASTECH now is a global leader in nonlinear optical crystals, laser crystals, precision optics and laser components in laser and optical communications industries. By integrating our leading capabilities of proprietary crystal growth, polishing, coating, assembly and designing technologies vertically, CASTECH has developed a broad range of magneto-optics devices, acousto-optics devices, electro-optics devices, fiber-optics devices, beam expanders, photoelastic modulators and other laser components for most demanding applications, to assist with our customers from prototype to mass production.



- Founded in 1990 by FIRSM (Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences).
- A public company (2008, Shenzhen, China, Stock Code: 002222).
- Sales revenue over US\$80 millions.
- Over 1,000 employees.
- 40,000 m<sup>2</sup> facility.
- The ratio of domestic and international markets stands at 5:5

### — CONTACT US —



[www.castech.com](http://www.castech.com)



[sales@castech.com](mailto:sales@castech.com)



+86-0591-83711593



Building No.9, Zone F, 89 Ruanjian Avenue, Fuzhou, Fujian, China

### Crystal Growth

A variety of growth methods to provide a wide selection of high-quality crystals



### Ultrasonic Cleaning

Superior cleaning effects



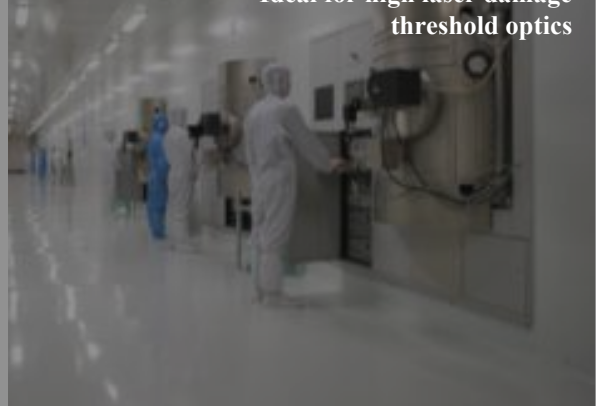
### IBF

High surface quality without sub-damage layer



### IBS Coators

Ideal for high laser damage threshold optics



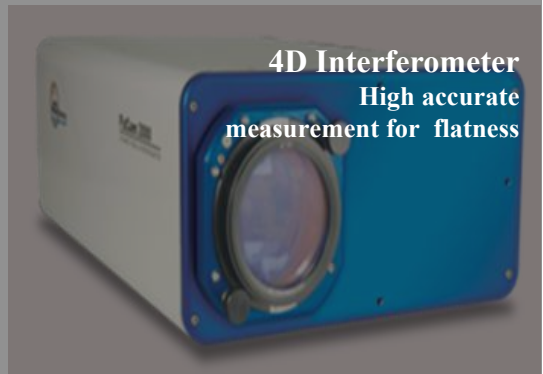
### LDT Testing

Continuous guarantee & improvement of laser damage threshold level



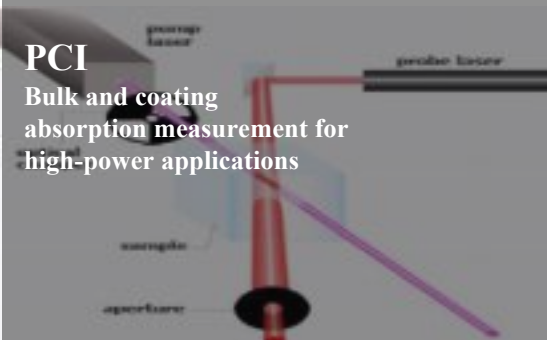
### 4D Interferometer

High accurate measurement for flatness



### PCI

Bulk and coating absorption measurement for high-power applications



### Microscopes

Ensure high surface quality of each component





## CAPACITY

### **M<sup>2</sup> Meter**

Vigorous laser beam quality measurement



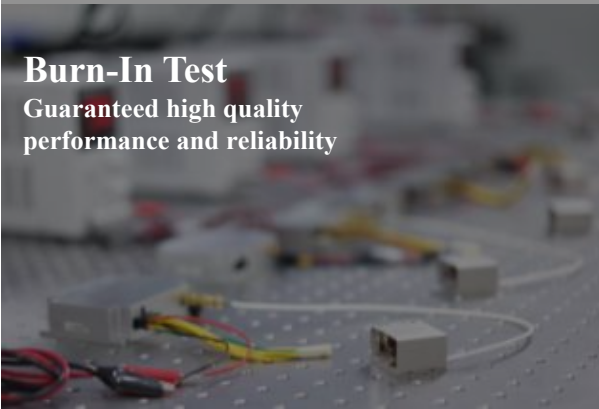
### **Fiber Optic Splicing**

A variety of optical fiber fusion splicing methods to meet most demanding applications



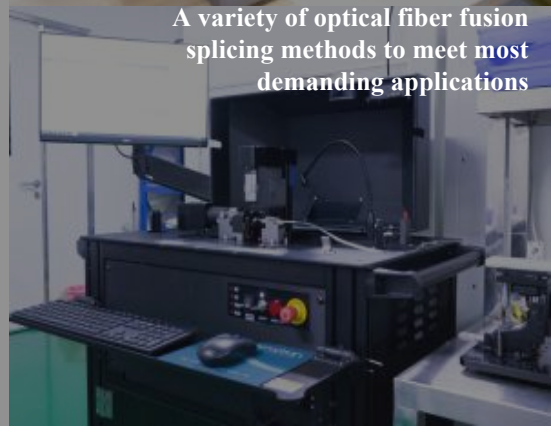
### **Burn-In Test**

Guaranteed high quality performance and reliability



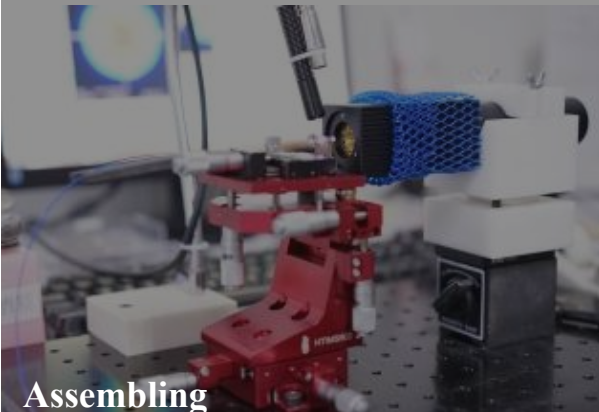
### **Production Workshops**

Clean workshops ensure product quality



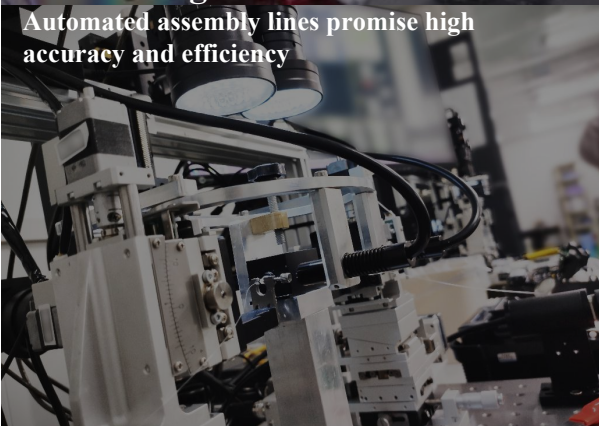
### **Assembling**

Automated assembly lines promise high accuracy and efficiency



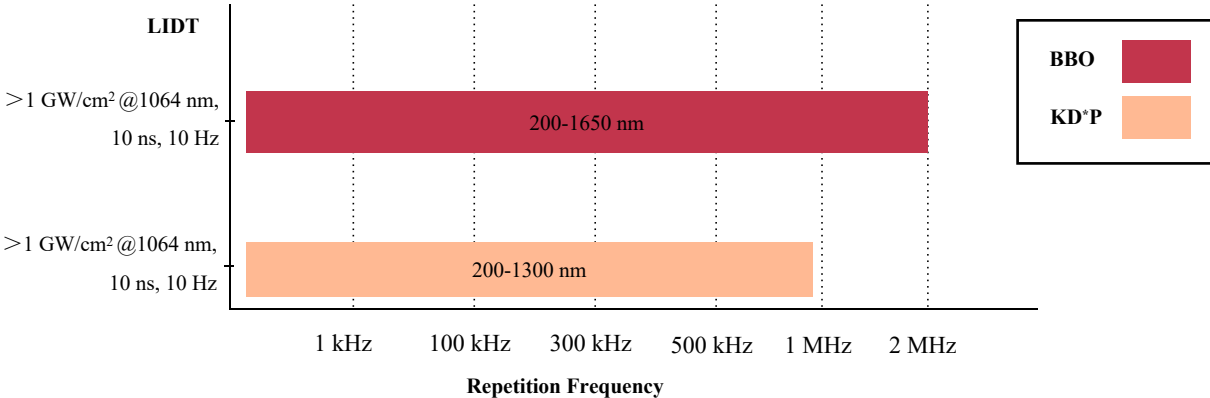
### **Fiber Coupling**

Automated fiber coupling system with high accuracy and performance



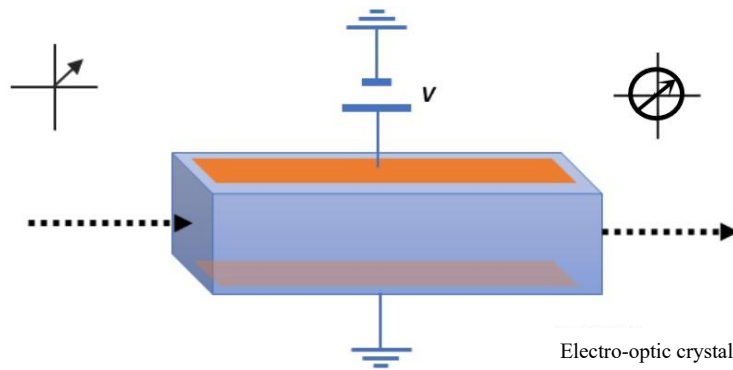
# Electro-Optic Devices

- 43 ● BBO Pockels Cells
- 45 ● KD\*P Pockels Cells



# Principles of Electro-Optical Devices

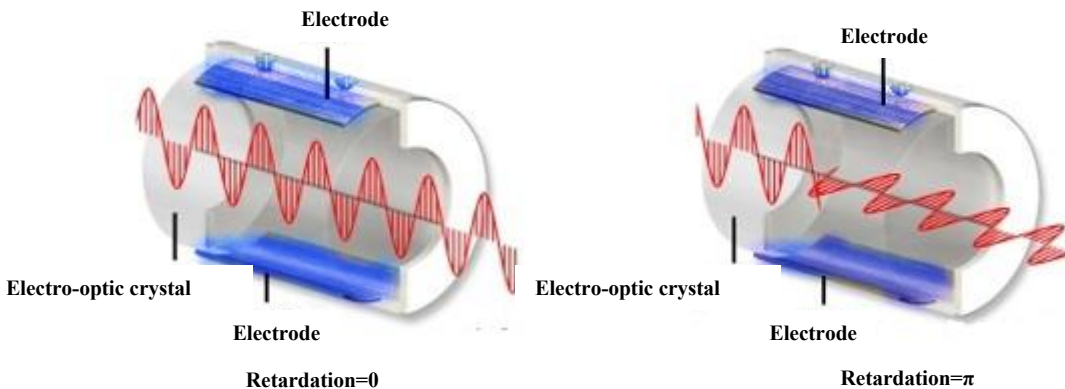
Electro-optical devices are made based on electro-optical effect, which generally refers to the Pockels effect, which means that the refractive index of a transparent medium (such as an electro-optical crystal) changes with the intensity of the electric field under the action of a constant or alternating electric field. The change of its refractive index is proportional to the magnitude of the applied electric field. It was first discovered by German physicist Friedrich Pockels in 1893 that when a driver applies a voltage to an electro-optic crystal, the optical axis of the crystal rotates directionally, and the refractive index changes immediately. Due to the different propagation velocities of light in the O and E directions inside the crystal, there is a certain phase difference between the two when they reach the same position. Therefore, the electro-optic crystal is equivalent to an optical wave plate with a variable phase retardation at this time, which can phase-modulate the polarized light incident inside it.



Schematic diagram of electro-optical device

In summary, we know that the electro-optic effect makes the electro-optic crystal an optical wave plate with variable phase retardation which can be continuously changed in theory, and some of the retardations have unique properties, such as  $0$ ,  $\pi/2$ , and  $\pi$ .

CASTECH can provide high-performance electro-optic Q switches based on BBO, KD\*P and other materials. The product could achieve high-speed modulation up to frequency of 2MHz, meanwhile, withstand high laser power, which is widely used in high-power Q-switching, pulse picking, regenerative amplification and other systems.



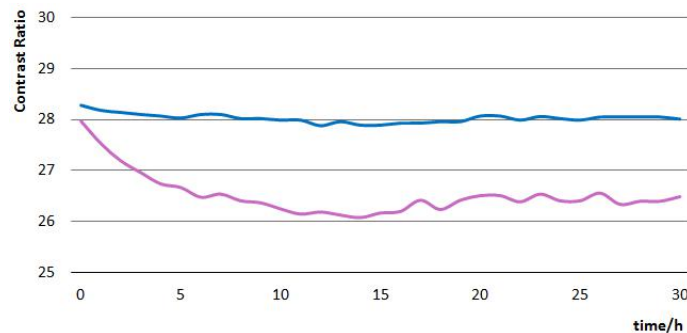
# BBO Pockels Cells

**BBO Pockels cell** is a laser device based on electro-optic effect. When a voltage is applied to the electro-optic crystal, the refractive index of the crystal will change and the phase difference caused by the birefringence of the polarized light transmitted along the optical axis will cause the change of polarization state after exiting. The working principle of the BBO Pockels cell is based on the transverse electro-optic effect, so the working voltage can be effectively reduced by changing the size of the BBO crystal. CASTECH provides BBO Pockels cells in a range of configurations to adapt to different use conditions even unique and demanding applications. Due to its low ringing effect, repetition frequency of CASTECH's Pockels cell can go as high as 2 MHz, while by working with CASTECH' driver, its repetition frequency can reach up to 1 MHz. CASTECH also provides BBO Pockels cells with polarizers, wave plates and ceramic plates as requested.

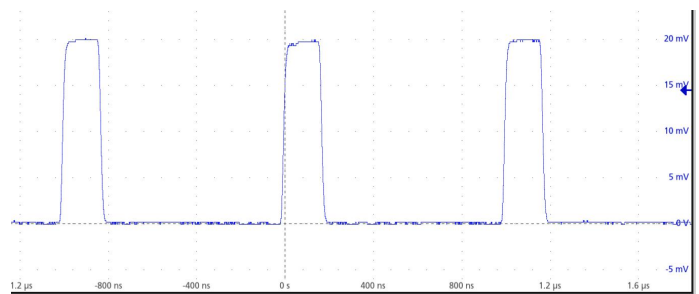


## Applications

- Q-switching
- Regenerative amplifier
- Pulse picker
- Cavity dumping
- High speed optical switch
- Beam chopper
- Optical power stabilizer



CASTECH products (blue) Contrast Ratio @1 MHz



Typical waveform @1 MHz

# BBO Pockels Cells

## Pockels Cells Model Number: BPt-alq-b-w

Type(t)	Effective Clear Aperture(a)	Crystal Length(l)	Cascade type(q)	Optional Accessories(b)	Wavelength(w)
A (Square)	3 (2.6 mm)	A (20 mm)	S (Single)	C (Ceramic)	355 nm
C (Round)	4 (3.6 mm)	B (25 mm)	D (Double)	L (Water Cooling)	532 nm
S (Special aperture)	5 (4.6 mm)	C (16 mm)	T (Triple)	W (Wave plate)	800 nm
	6 (5.6 mm)	D (14 mm)	...	B (Brewster window)	1030 nm
	7 (6.6 mm)	...		A (Brewster window & Wave plate)	1064 nm
	8 (7.6 mm)			N (Nothing)	1550 nm
	10 (9.6 mm)			...	...
	12 (11.6 mm)				
	114 (1*14 mm)*				
	214 (2*14 mm)*				
	...				

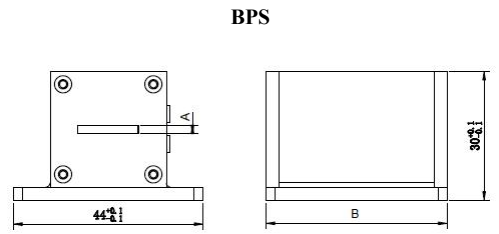
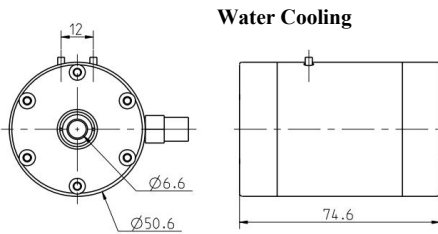
\*Only applicable to S (special aperture) type products

### Typical Specifications\*

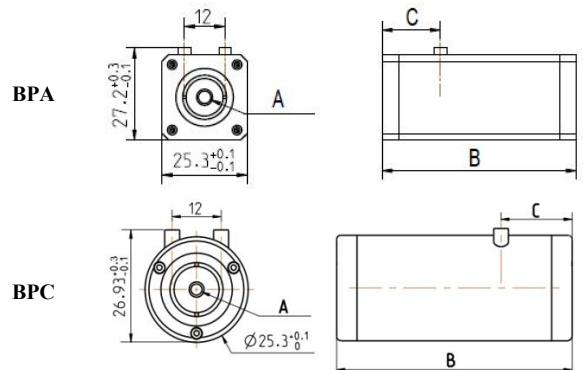
Clear Aperture	Voltage Contrast Ratio (VCR) @1064 nm	Rise/Fall Time	Cascade Type	Cooling Method	Transmission @1064nm
3~6 mm	≥1200:1	<10 ns	Single	Conduction Cooling	≥99%
3~6 mm	≥1000:1	<10 ns	Double	Conduction Cooling	≥98.5%
7mm	≥500:1	<20 ns	Double	Water Cooling	≥98.5%
8 mm	≥500:1	<20 ns	Double	Water Cooling	≥98.5%
12 mm	≥400:1	<20 ns	Double	Water Cooling	≥98.5%

\*Damage threshold: 1GW/cm<sup>2</sup> @ 1064 nm, 10 ns & 50GW/cm<sup>2</sup> @ 1064 nm, 1 ps, & 200GW/cm<sup>2</sup> @ 1064 nm, 100 fs

### Housing dimensions(mm):



	3AS	3BS	4AS	4BS	3AD	4AD	6AD
A	2.6	2.6	3.6	3.6	2.6	3.6	5.6
B	35	40	35	40	57.7	57.7	57.7
C	17.5	20	17.5	20	17.4	17.4	17.4
λ/4 voltage @ 1064 nm	3.5kV	2.8kV	4.9kV	3.9kV	1.8kV	2.5kV	3.7kV





# KD\*P Pockels Cells

The **KD\*P Pockels cell** is a laser modulation component based on the electro-optic effect of the DKDP crystal. The products can be divided into transverse electro-optical effect series and longitudinal electro-optical effect series.

The products of the transverse electro-optical effect series utilize the transverse electro-optical effect of DKDP crystals when the light propagation direction is perpendicular to the electric field. By controlling the number and size of the crystals, the working voltage is effectively reduced to hundreds volt level, and the repetition frequency can reach up to 1 MHz.

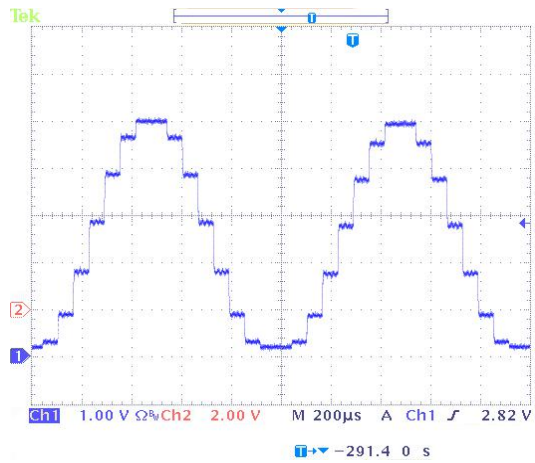
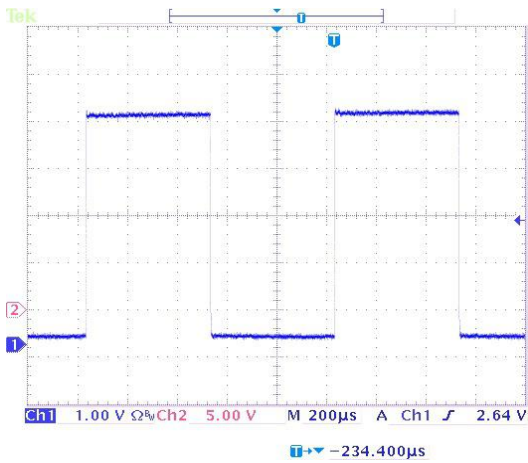
The longitudinal electro-optical effect series products utilize the longitudinal electro-optical effect of the DKDP crystal when the propagation direction of light is parallel to the electric field. CASTECH's longitudinal KD\*P Pockels cell has excellent optical uniformity, high extinction ratio, and high transmittance.

CASTECH can provide a series of products with BNC connectors, as well as accessories such as polarizers, wave plates and ceramic plates, to facilitate impedance matching.

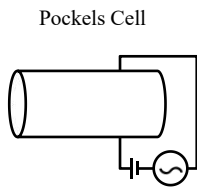


## Applications

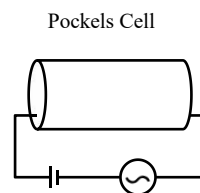
- Q-switching
- Regenerative amplifier
- Pulse picker
- Cavity dumping
- Beam chopper
- High speed optical switch
- Optical power stabilizer



**Typical modulation waveform of transverse electrode configuration**



**Schematic diagram of transverse electrode configuration**



**Schematic diagram of longitudinal electrode configuration**

# KD\*P Pockels Cells

## Longitudinal Electro-Optical Type Model Number: **DPC-taq-c-b-w**

Type(t)	Clear Aperture(a)	Type(q)	Cascade Type(c)	Optional Accessories(b)	Wavelength(w)
L (Longitudinal Electro Configuration)	6(6 mm) 7(7 mm) 8(8 mm) 10(10 mm) 12(12 mm) 15(15 mm) ...	S (Single) D (Double) ...	P (Pin) W (Wire) ...	C (Ceramic) W (Wave plate) B (Brewster window) A (Brewster window) & Wave plate N (None) ...	355 nm 532 nm 1030 nm 1064 nm ...

## Transverse Electro-Optical Type Model Number: **DPT-alq-b-w**

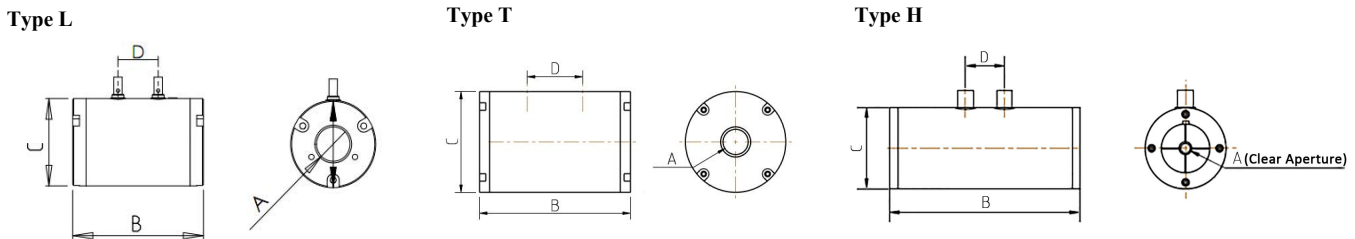
Type(t)	Clear Aperture(a)	Crystal Length(l)	Cascade Type(q)	Optional Accessories(b)	Wavelength(w)
T (Low Repetition Frequency) H (High Repetition Frequency)	3(3 mm) 4(4 mm) 5(5 mm) 6(6 mm) 7(7 mm) 8(8 mm) 10(10 mm) ...	A (20 mm) B (25 mm) C (40 mm) ...	D (Double) Q (Four) ...	W (Wave plate) B (Polarizer) A (Brewster window) & Wave plate N (None) ...	355 nm 405 nm 532 nm 1030 nm 1064 nm ...

### Typical Specifications\*

Type	Clear Aperture	Voltage Contrast Ratio @1064 nm	Rise/Fall Time	Cascade Type	Transmission @1064 nm
Longitudinal	6~15 mm	≥1000:1	<20 ns	Single	≥98.5%
Transverse	3~10 mm	≥500:1	<20 ns	Double	≥98%

\*Damage threshold: 10 J/cm<sup>2</sup> @ 1064 nm, 10 ns

### Housing dimensions(mm):



	L8S	L10S	L12S	L15S	3BD(H)	5BD(H)	10AD(T)
<b>A</b>	8	10	12	15	3	5	10
<b>B</b>	28	39	44	44	70	66	60
<b>C</b>	19	25.4	25.4	30	40	50	40
<b>D</b>	10	12	15	15	22	24	22
<b>λ/4 voltage @ 1064 nm</b>	3.5kV	3.5kV	3.5kV	3.5kV	0.6kV	1.0kV	2.1kV

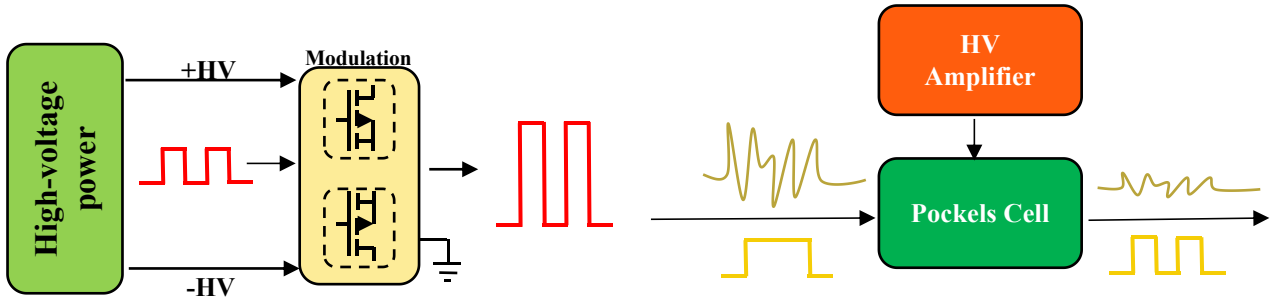
# Drivers

49	●	RF Drivers
52	●	Pockels Cell Drivers



# Drivers Introduction and Concepts

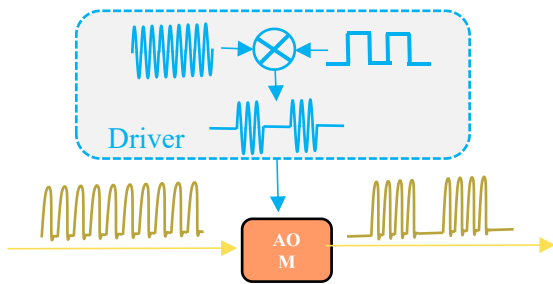
Pockels cell driver is composed of a high-voltage power source and a modulation circuit. Through external control signals, the high-voltage tube array is triggered to generate high-voltage pulses. The voltage difference applied to the Pockels cell causes electro-optical effect. The rise/fall time of high voltage pulses are less than 10ns, which is applicable to Q-switching, pulse selection systems and etc. Optical switch, optical power attenuation, and optical power stabilization can also be achieved by changing the voltage (output power).



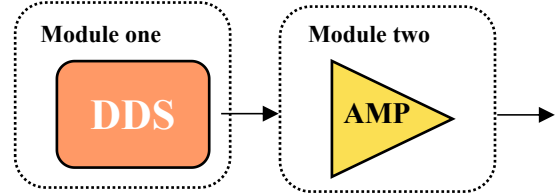
Schematic diagram of Pockels cell driver

Schematic diagram of electro-optical noise reduction/optical switch

RF driver consists of RF source, RF switch and RF amplifier, it is mainly applied to drive the acousto-optic device. Users can change the control mode of the RF switch according to actual needs to achieve different RF output effects. Control methods include digital control, analog control and first pulse suppression, etc. RF driver can be applied to different application scenarios, according to different control modes. RF driver produced by CASTECH is optimized to match with our acousto-optic device products to achieve its best performance.

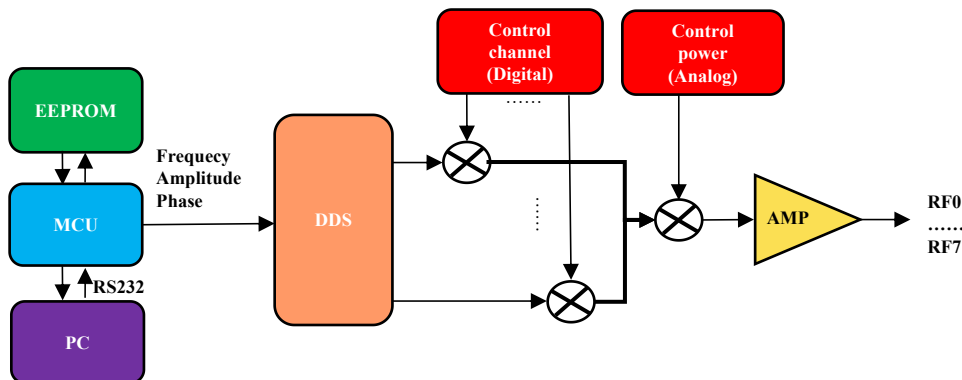


Schematic diagram of RF driver



Schematic diagram of RF source amplifier

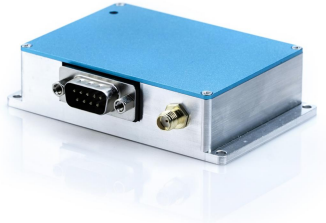
CASTECH can provide variable-frequency RF drivers, which adapt to acousto-optic frequency shifters, deflectors, filters according to different applications. Users can control various functions through the host computer software according to their needs. CASTECH can also customize high-precision, high-stability radio frequency source DDS and amplifier modules to support our customers.



Schematic diagram of variable-frequency RF driver

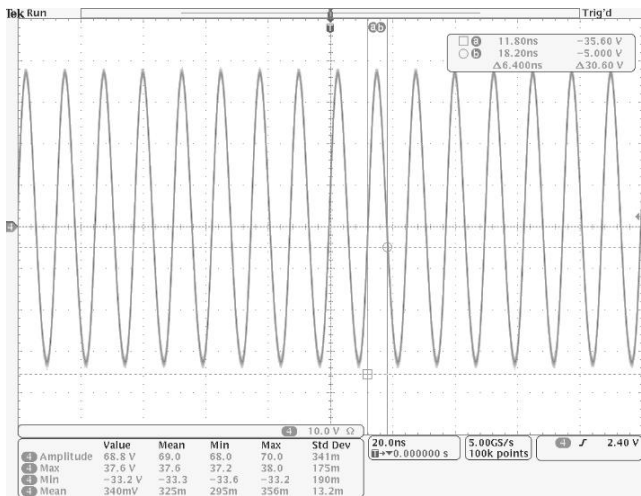
**RF drivers** can generate RF signals at fixed or variable-frequencies. Specified waveforms could be produced by different modulated signals to meet the requirements of different acousto-optic components and determine how much an optical beam is modulated, deflected, or tuned. CASTECH's RF drivers are able to generate RF signal at 27.12MHz, 40.68MHz, 68MHz, 80MHz, 100MHz, 120MHz, 200MHz, 250MHz, 300MHz and even higher, with RF power up to 120W. A variety of operating modes are available including FPS, PPK, R05 and A05 (Analog).

Acousto-optic variable-frequency series drive of frequency shifter, deflector and filter, can output RF signal with high precision and broad frequency range, and support digital control, analog control, *etc.* PC softwares are equipped, with which users can set the frequency and power at will. The frequency sweeping and other functions can also be set (TA series). For high-speed frequency conversion applications, it is capable of fast frequency switching(TB series).

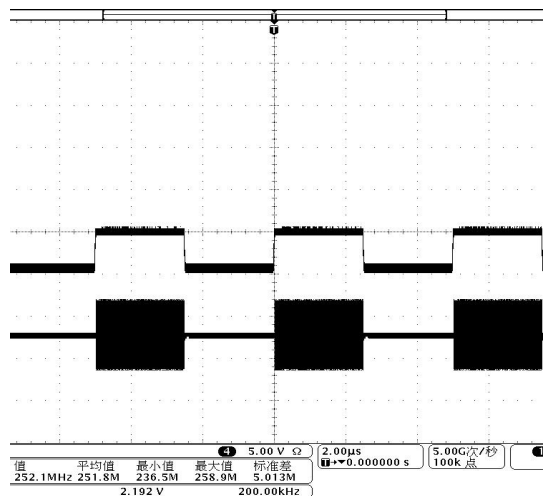


## Applications

- Matching acousto-optic components



RF Output Waveform



Modulation Waveform



# RF Drivers

## Fixed-Frequency Series Model Number: CARD-as-f-vpt-bme-c

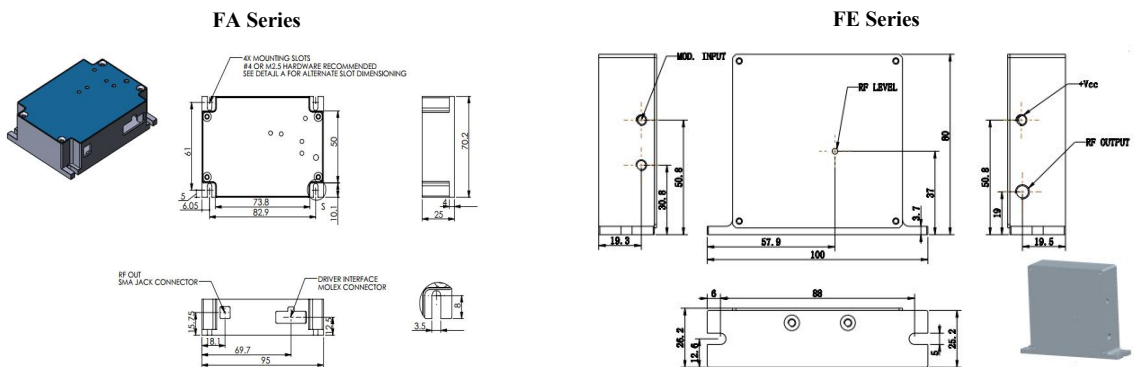
Series(as)	RF(f)	Supply Voltage(v)	Output Power(p)	Cooling(t)	Channel(b)	Mode(m)	Function(e)	RF Connector(c)
FA (Fixed-frequency series A)	40.68 MHz 68 MHz 80 MHz	15D (15 VDC) 24D (24 VDC)	20 W 25 W	C (Conduction-Cooled)	1	F (FPS) P (PPK) A (A05) R (R05) M (M05)	C (Common) H (TTL_HIGH = RF on) L (TTL_HIGH = RF off)	AF (SMA-F)
FD (Fixed-frequency series D)	40.68 MHz 68 MHz 80 MHz 100 MHz 110 MHz 120 MHz ...	12D (12 VDC) 15D (15 VDC) 24D (24 VDC)	5W 20W 40W	C (Conduction-Cooled) A (Air-Cooled) W Water-Cooled	1	F (FPS) A (A05) D (Digital)		
FB (Fixed-frequency series B)	27.12 MHz 40.68 MHz 68 MHz 80 MHz	24D (24 VDC) 28D (28 VDC)	50W 100W	C (Conduction-Cooled) A (Air-Cooled) W Water-Cooled	1, 2	F (FPS) A (A05) D (Digital)		NF (BNC-F)
FE (Fixed-frequency series E)	200 MHz 250 MHz 300 MHz ...	24D (24 VDC)	2.5 W	C (Conduction-Cooled)	1	D (Digital) A (A05)* DA (Digital+Analog)		AF (SMA-F)

\*Analog control voltage can be requested: A5: 0-5 V, A1: 0-1 V

## Typical Specifications

Working Frequency	Maximum RF Power	Rise/Fall time
27.12 MHz	100 W	<150 ns
40.68/68/80 MHz	15/20/25 W	<35 ns
200/250 MHz	2.5 W	<6 ns

## Housing dimensions(mm):



# RF Drivers

## Variable-Frequency Series Model Number: CARD-as-f-vpt-bme-c

Series(as)	RF(f)	Supply Power(v)	Output Power(p)	Cooling(t)	Channel(b)	Mode(m)	Function(e)	RF Connector(c)
TA (Variable-frequency series A)	60~120 MHz ...	24D (24 VDC)	0.5~4 W	C (Conduction-Cooled)	1	Programmable frequency	C (Common) ...	AF (SMA-F) AM (SMA-M)
TB (Variable-frequency series B)	70~120 MHz ...	24D (24 VDC)	0.5~4 W	C (Conduction-Cooled)	1	A (A05)* D (Digital)	Px (channel)	AF (SMA-F)
TE (Variable-frequency series E)	70~120 MHz	24D (24 VDC)	0.5~4 W	C (Conduction-Cooled)	1	Voltage control 0~10V D (Digital)	C (Common) ...	AF (SMA-F) CF (SMC-F)

\*Analog control voltage can be requested: A10: 0-10 V, A5: 0-5 V, A1: 0-1 V

## Typical Specifications

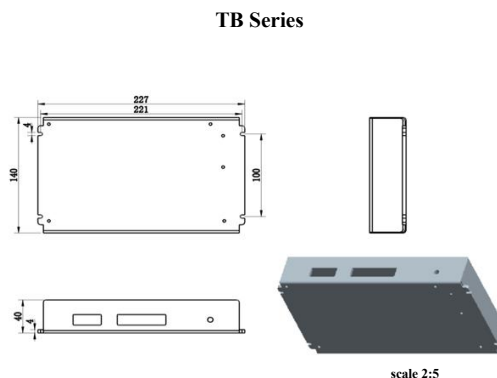
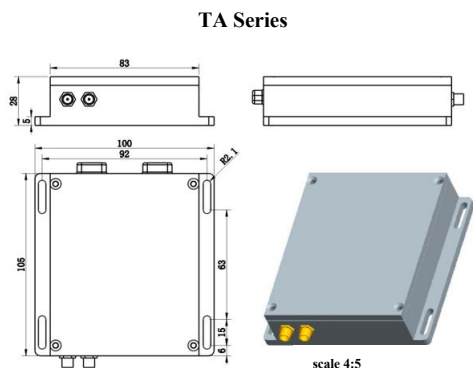
Working Frequency	RF Power*	Working Mode***	Switching Speed
60~120 MHz	4 W	Programmable frequency**	~us
70~120 MHz	4 W	Voltage control 0~10 V, Digital**	~50ns

\*The output power of the product is matched according to the load

\*\* Supporting related host computer software and control instruction set

\*\*\*Special control methods can be customized

## Housing dimensions(mm):



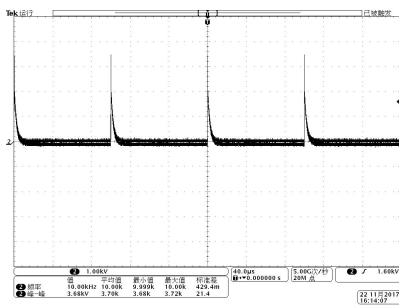
# Pockels Cell Drivers



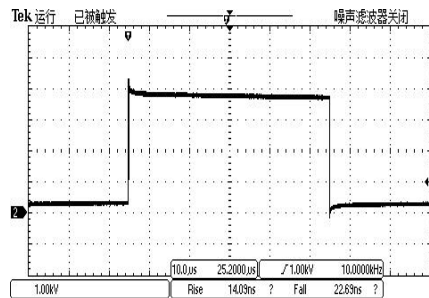
CASTECH provides drivers to complement our Pockels cell series. When receiving a certain frequency trigger signal, **Pockels cell driver** will generate a high voltage with same frequency. By working with a signal generator, the driver is suitable for industrial integration, and can also be controlled by computer (USB to RS-232), which is convenient for scientific research institutes and industrial users to operate intelligently. CASTECH's Pockels cells driver is compatible with the KD\*P Pockels cells at low repetition frequency and the BBO Pockels cells at high repetition frequency (~1MHz), the minimum pulse width can reach ~20 ns (PCDH series). The waveform can be positive, negative, and square. CASTECH provides customized services.

## Applications

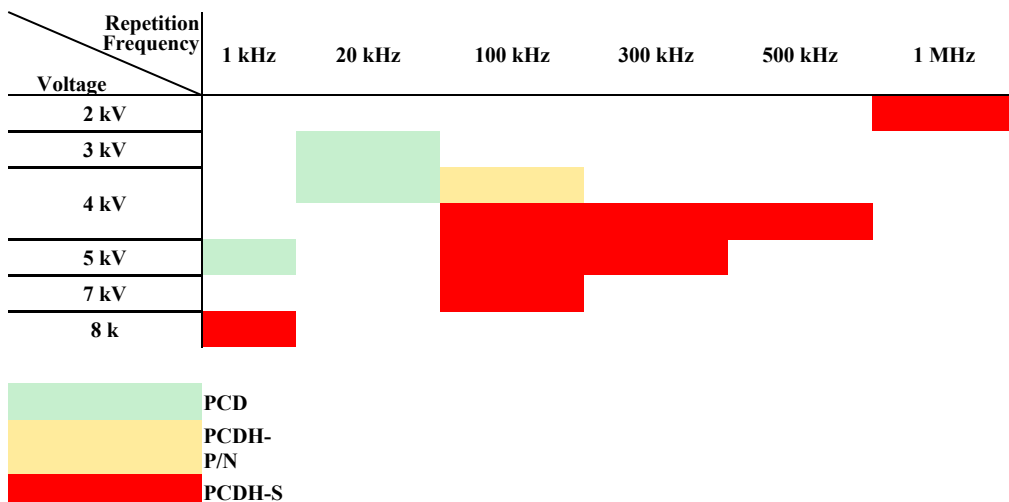
- BBO Pockels cell
- KD\*P Pockels cell
- Pulse picker



Typical positive waveform



Typical square waveform



Correspondence diagram of maximum voltage and maximum repetition frequency

# Pockets Cell Drivers

## Integrated Driver Model Number: PCD-m-f-t-h

Working Mode(m)	Maximum Voltage(v)	Maximum Repetition Frequency(f)	Trigger Mode(t)	Control Mode(c)
S (Square)	5 (5 kV)	1 (1 kHz)	E (External)	N (None) R (USB to RS-232)
	4 (4 kV)	20 (20 kHz)		

## Split Driver Model Number: PCDH-mv-f-t-h

Working Mode(m)	Maximum Voltage(v)	Maximum Frequency(f)	Trigger Mode(t)	Control Mode(c)
P (Positive) N (Negative) S (Square)	2 (2 kV)	1000 (1000 kHz)	E (External)	N (None)
	4 (4 kV)	100 (100 kHz)* 500 (500 kHz)		
	7 (7 kV)	100 (100 kHz)		
	8 (8 kV)	1 (1 kHz)		

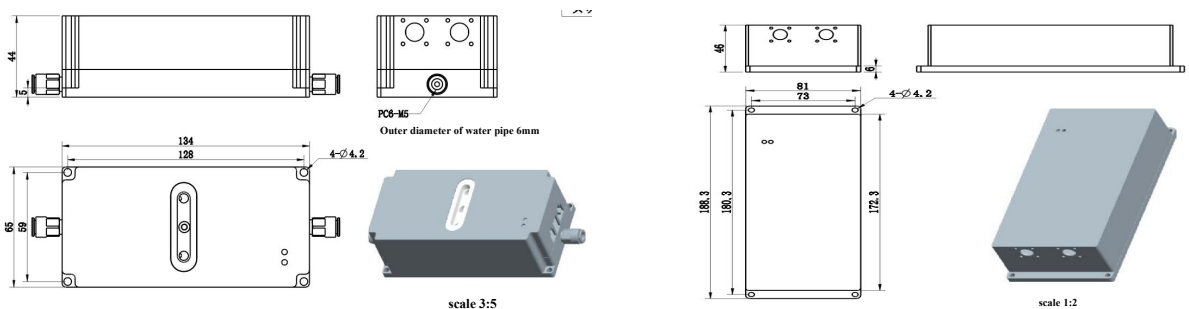
\* Only applicable to positiver/negative mode

## Typical Specifications

Working Mode	Pulse Amplitude	Maximum Frequency	Pulse Width	High Voltage Source	Rise Time	Fall Time
Square		20 kHz	200 ns~DC	Build-in	≤10 ns	≤10 ns
Positive	4 kV	100 kHz	-	External	≤10 ns	-
Negative	4 kV	100 kHz	-	External	-	≤10 ns
Square	4 kV	500 kHz	25 ns~10 μs	External	≤10 ns	≤10 ns
Square	5 kV	300 kHz	25 ns~10 μs	External	≤10 ns	≤10 ns
Square	8 kV	1 kHz	35 ns~10 μs	External	≤20 ns	≤20 ns

## Housing dimensions(mm):

### PCDH series



## Clarifications

---

### (1) Statement

Any technical description or content of any other nature published in any brochure or advertisement published by CASTECH, Inc. shall not be regarded and shall not constitute any statement or guarantee of any nature related to the goods or any part of the goods.

### (2) Copyright

The copyright of all drawings, specifications, documents and data prepared by CASTECH or the copyright of any part thereof belongs to CASTECH. Any part of the drawings, specifications, documents and data shall be not reprinted without the prior written consent of CASTECH.

### (3) Tort compensation

If CASTECH produces or supplies any goods in accordance with any specification, drawing or design provided by the buyer or the buyer's agent, and the goods or the production and supply of the goods constitutes infringements of any patent, copyright or property of any person, the buyer shall compensate CASTECH and continue to compensate for the damages against CASTECH caused by or related to the tort, all claims, compensation, losses, or expenses suffered by CASTECH.

### (4) Product performance

The product performance parameters or technical descriptions published by CASTECH are test results of internal laboratory. The buyer or the buyer's agent shall fully evaluate the applicability of the product when using it. CASTECH will not bear the product damage and related losses caused by insufficient evaluation.







福建福晶科技股份有限公司  
CASTECH INC.  
**ADD: Building No.9, Zone F, 89 Ruan  
jian Avenue, Fuzhou, Fujian  
350003, China**  
**TEL: +86-591-83710533**  
**FAX: +86-591-83711593**  
**E-mail: SALES@CASTECH.COM**



GWU-Lasertechnik Vertriebsges. mbH

Bonner Ring 9  
50374 Erftstadt  
Germany

Fon +49 . (0)22 35 . 9 55 22-0  
Fax +49 . (0)22 35 . 9 55 22-99

info@gwu-group.de  
www.gwu-group.de

